TECHNOLOGY DEPT.

- Allied Paper's new photographic paper mill
- Inorganic coatings and adhesive preparations
- Electrical engineering in the paper industry
- Effect of pulping variables on chemical consumption

The Paper Industry

Publishers of PAPER AND PULP MILL CATALOGUE

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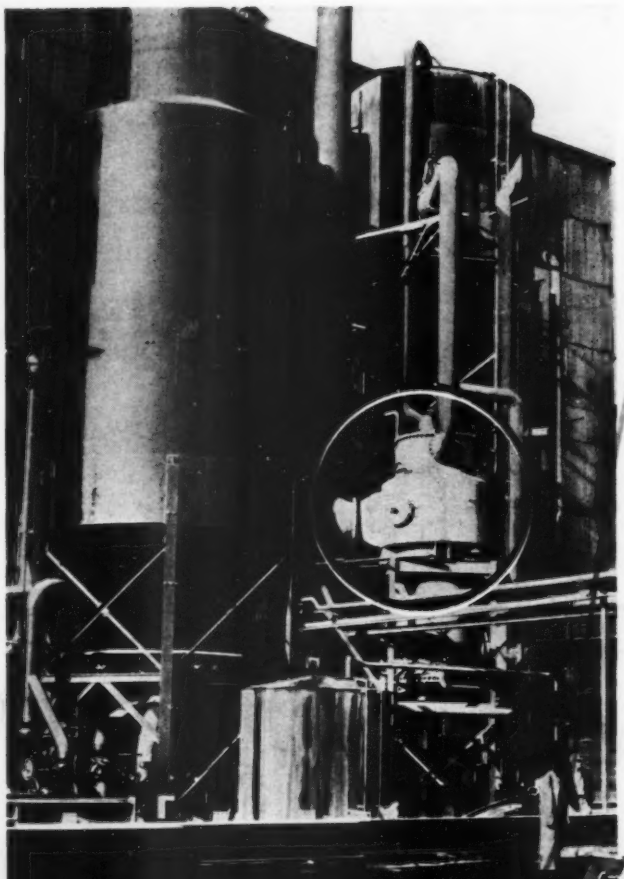

Digester Blow Heat Recovery System in a paper mill. SWENSON equipment is used by manufacturers of bags, cartons, magazines and many other forms of paper.

Hot Water Produced at Lower Cost!

High temperature water for pulp mill operation can be produced at lower cost with the SWENSON digester blow heat recovery system. The use of a surface type condenser provides clean hot water through the recovery of heat from the vapor released when blowing digesters. A centrifugal separator integral with the surface condenser removes liquor and pulp entrained in the blow vapor.

The SWENSON heat recovery system is designed on a digester basis — thus modifications are not required in future mill expansions with the same digester conditions. Automatic operation synchronized with the blowing cycle provides hot water at constant flow and temperature.

Send for full details on the SWENSON digester blow heat recovery system!

SWENSON EVAPORATOR COMPANY
15653 Lathrop Avenue, Harvey, Illinois

SWENSON
A Division of WHITING Corporation

Proved Engineering for the Process Industries
Since 1889

Chinese Rouge Box of the Ch'ien-lung Dynasty (1736-1795 A.D.). Made of blue and white porcelain, featuring the Yang-Yin symbol on the cover.

Courtesy of The Metropolitan Museum of Art, New York.

This symbol (Yang-Yin) represents T'ai-chi, the old Chinese *Ultimate Principle*, and as such, perfection. As the Asten-Hill trademark it symbolizes perfection in ASTEN DRYER FELTS for paper mills.

Name and trademark registered

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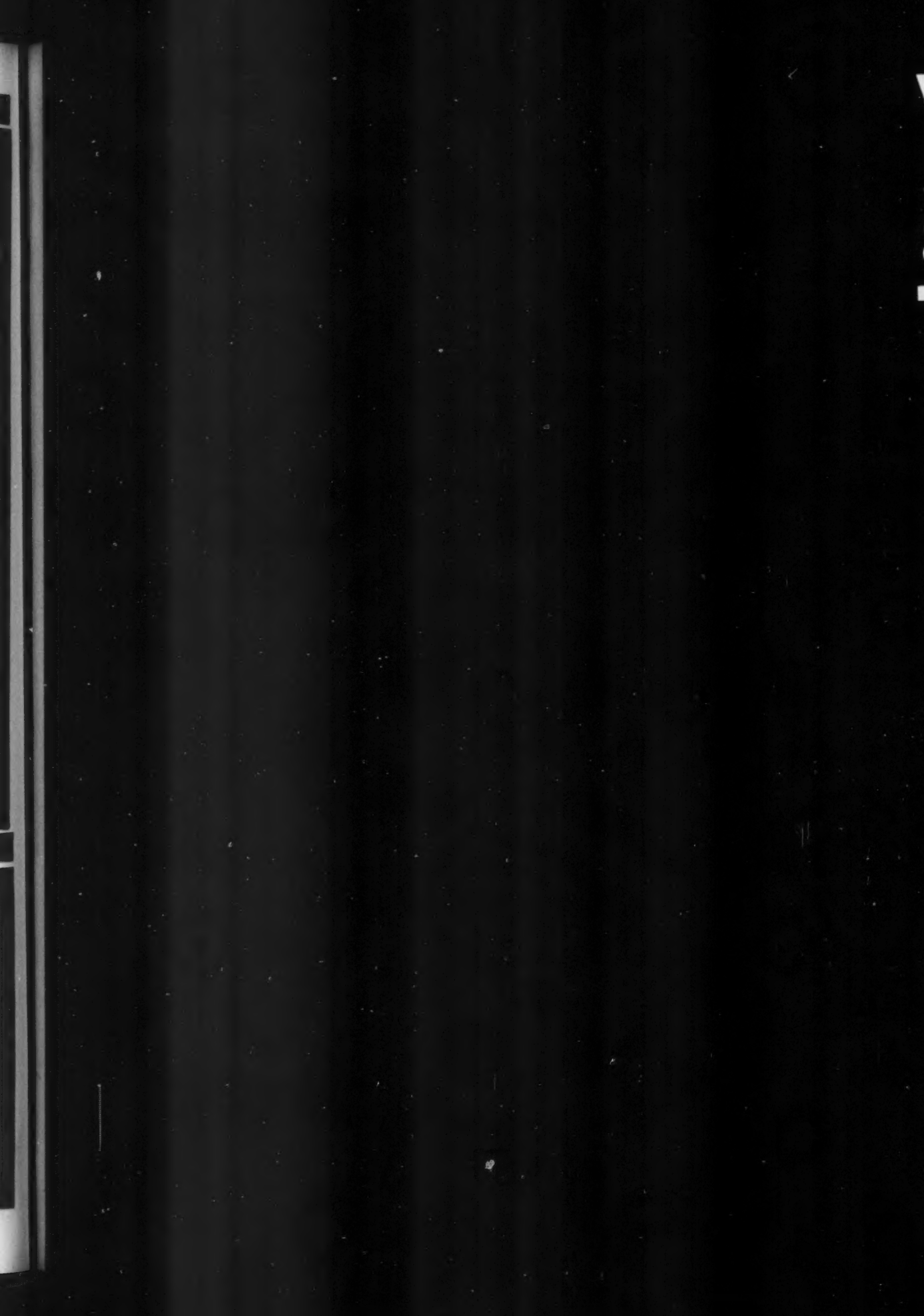
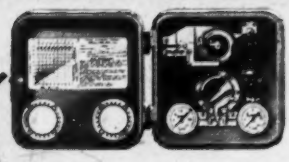
Walterboro, S.C.
Salem, Ore.

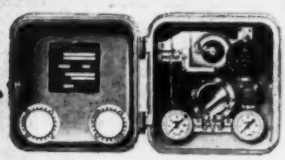
ASTEN-HILL LIMITED
Valleyfield, Quebec



FISHER®
LEVEL-TROL
The Answer to Your Liquid Level Needs

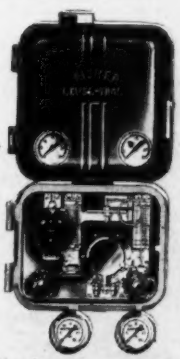


TYPE 2500—proportional pilot for general liquid level control applications.



TYPE 2500T — Level-Trol pilot used as pneumatic level transmitter.

TYPE 2500C—pilot with level indicator. Indicator available on all style Level-Trol pilots.



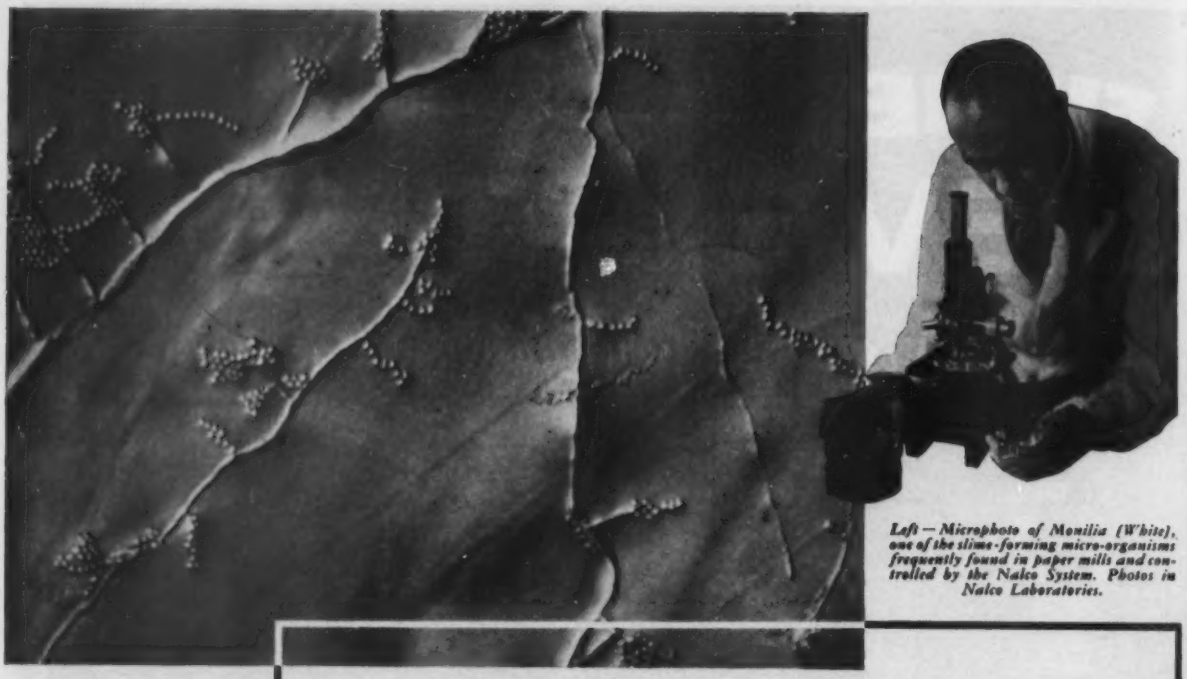
TYPE 2500 — 2516 dual Level-Trol pilot consisting of Type 2500 for remote level-indication or recording and Type 2516 controller with proportional and reset response.

The wide variety of pilots available for mounting on the Level-Trol gives further evidence of the Level-Trol's ability to handle practically any liquid level, interface level, or specific gravity control or indication problem.

FISHER GOVERNOR COMPANY
MARSHALLTOWN, IOWA • WOODSTOCK, ONTARIO

WORLD LEADER IN RESEARCH FOR BETTER PRESSURE AND LIQUID LEVEL CONTROL

FISHER Since 1880



Left — Microphoto of Monilia (White), one of the slime-forming micro-organisms frequently found in paper mills and controlled by the Nalco System. Photos in Nalco Laboratories.

FORMULA FOR SUCCESSFUL SLIME CONTROL

SLIME control, like paper making itself, requires constant and careful attention to details. Here is a formula for successful slime control which will cut to a minimum, spots and specks, breaks, cleaning, and other costly problems due to slime:

- Identify slime-forming organisms to be controlled.

A NALCO SERVICE

- Determine the best types of treatment to be used.

A NALCO SERVICE

- Locate, by detailed survey, the proper points of application.

A NALCO SERVICE

- Provide consistent supervision to check application and effectiveness of treatment.

A NALCO SERVICE

- Maintenance of high standards of sanitation throughout the mill. (Even the best of treating and scientific control can be seriously hampered by unsanitary conditions.)

Nalco Field Representatives and the modern, scientific facilities of the Nalco Laboratories are at your service to put this formula for successful slime control into practical operation in your mill. Write for details today.

NATIONAL ALUMINATE CORPORATION
6232 W. 66th Place • Chicago 38, Illinois

Canadian inquiries should be addressed to Alchem Limited Burlington, Ontario

Nalco

erving the Paper Industry through Practical Applied Science

The Paper Industry

Technology • Engineering • Management • Production

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THE paper made by this machine began as bagasse, the waste from crushed sugar cane.

Pioneered by W. R. Grace & Co., the production of papers and corrugated board from bagasse has given Peru a thriving new industry which utilizes the country's own raw materials and labor. In expanding the capacity of its plant at Paramonga by 50%, Grace will employ its new continuous pulping method to transform bagasse directly into paper pulp within a few minutes after it leaves the sugar mill.

Paper making is but one of many flourishing enterprises of Grace's South American Group. Now carrying forward a dynamic program of diversification in the United States, W. R. Grace & Co. also plans for continuing concentration in basic growth industries of Central and South America.

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From our point of view . . .

Are we expanding at an excessive rate?

The concern about overproduction in the pulp and paper industry has received renewed impetus with the implementation of the 1956-58 expansion program, which by the end of 1958 will add 5,100,000 tons of paper to the 1955 United States production of 30,800,000 tons.

While the concern about overproduction is prevalent, it does not, however, reflect a unanimity of point of view among paper manufacturers inasmuch as current signs point to a continuation of a tight paper supply.

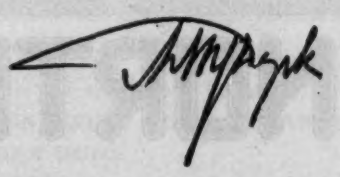
Newsprint consumption in the U.S., despite prevailing gray market prices, is proceeding at an increased annual rate of more than 5 per cent, which is approximately in balance with the estimated 19 per cent increased newsprint capacity we shall have on the North American continent by the end of 1958.

It is difficult to resist the temptation to expand at a maximum or near-maximum rate in the face of an unusually strong market. The warnings that we are expanding at a greater rate than that envisaged by the Stanford Institute Report can be countered with the argument that the estimates made in this report may have been too conservative.

Add to this the American people's inherent predisposition to optimism, and it becomes practically impossible to control the urge to expand to the limits of the markets' demands.

It is not the purpose of this editorial to dwell on the advisability or inadvisability to expand or to predict the results of the current expansion rate, except to point out that these are intimately tied up with our overall national economy. The current expansions would seem justified if the national economy remains strong, and there is no evidence to the contrary.

What we would like to state more categorically is that there is no easy way to control growth in an expansion-minded industry, and those who are convinced that we are faced with overexpansion in the pulp and paper industry can insure themselves against the hazards of overproduction by concentrating a greater effort on technical research and market development. It is surprising what hidden production and market opportunities can be uncovered by systematic research in these endeavors.



HANDLING A SEA OF PULPWOOD!

IN the picture, below, you are looking out over the great pulpyard of the Brown Paper Mill Co. at West Monroe, La. The big 95 Northwest handling the grapple is one of several Northwests that this company owns.

Your Northwest Crawler Crane goes anywhere. It brings you a flexibility and stability you can't get with locomotive crane equipment. It will travel the length of a train without an extra line of track and where flats or drop-end gondolas are used, it will travel on the train itself.

The ability to handle long booms and the wide range of boom hoist equipment, including live boom, permits using storage areas beyond the range of a locomotive crane. Your crawler can move into a pile as it loads out or move out as it stacks new shipments and still reach the car.

Crawler mobility means high loading capacity where and when you want it—and, for small mills the crawler has additional value. It can be easily routed to other jobs — the loading dock, setting machinery, handling bulk materials will extend its usefulness.

If you are planning new crane equipment get full details on the Northwest. Ask for a catalog on the size machine you need.

NORTHWEST ENGINEERING COMPANY
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NORTHWEST

The Crane That Goes Anywhere

10 to 50 TONS

Uniformity in your board starts with uniformity in our starch

When buying high quality paper board, your customers appreciate consistently uniform basic materials. Your best guarantee of a board with uniformity and durable printing surface from run to run is Eagle brand corn starch. In addition, you will be able to give your customers an improved finish and better surface that resists scuffing.

Eagle brand corn starch is an acid-converted starch known for its ease of cooking, high fluidity and low viscosity. Here is your answer to uniform quality board at competitive prices —the right way to repeat sales.

Ask the man from Corn Products, he can help with product information and engineering assistance. Whatever your paper-making problem, he will be able to supply you with the technical assistance you require.

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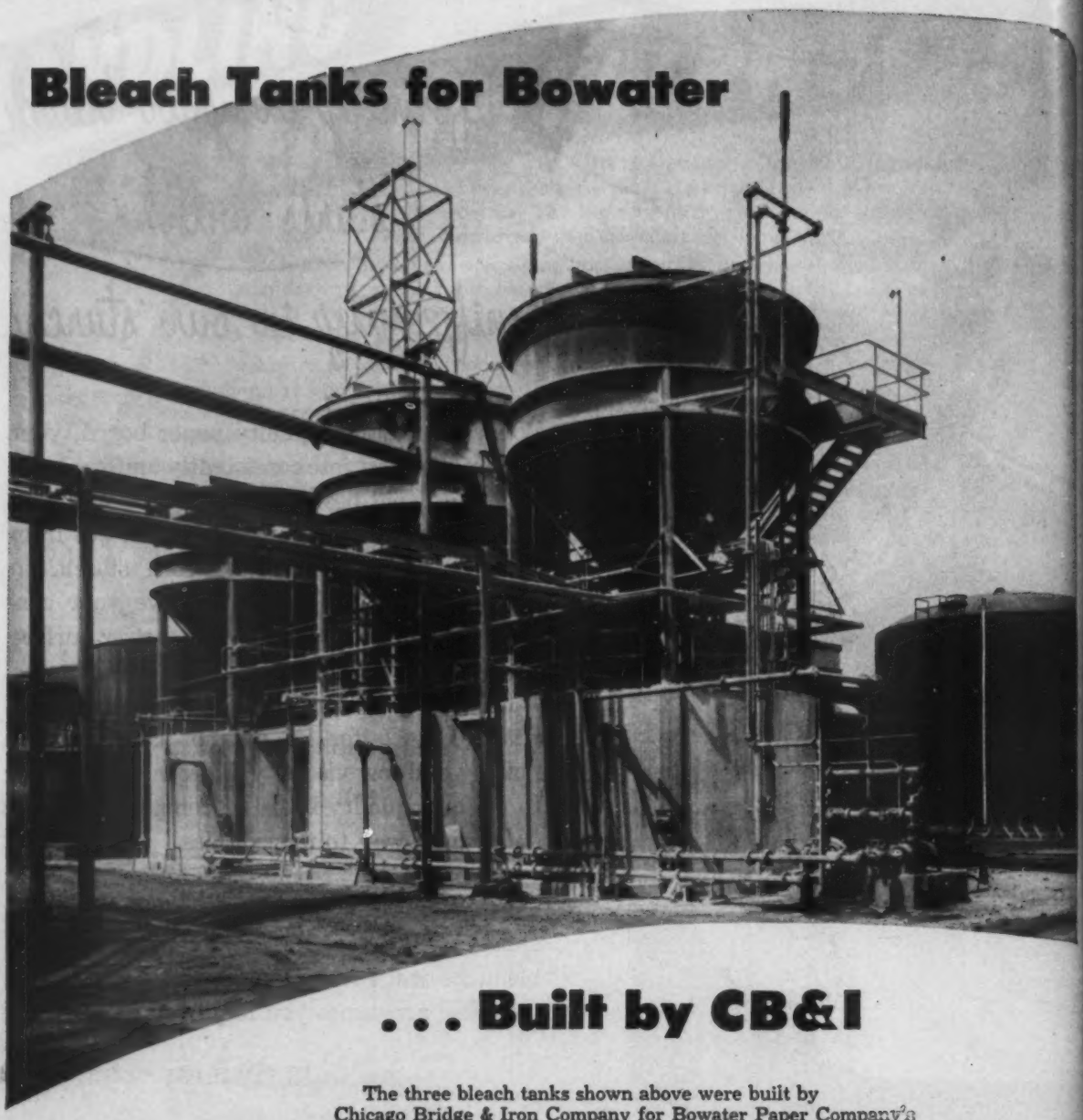
Bleach Tanks for Bowater



. . . Built by CB&I

The three bleach tanks shown above were built by Chicago Bridge & Iron Company for Bowater Paper Company's new $55 million newsprint and kraft mill at Calhoun, Tennessee. CB&I also fabricated and erected 60 other steel plate structures including five digesters to handle the mill's daily production of 312 tons of raw kraft.

Steel plate structure craftsmen for over 65 years, CB&I designs, fabricates and erects storage tanks, digesters, Conkey evaporators, elevated tanks and other structures for the pulp and paper industry. Write our nearest office for further information, estimates or quotations.

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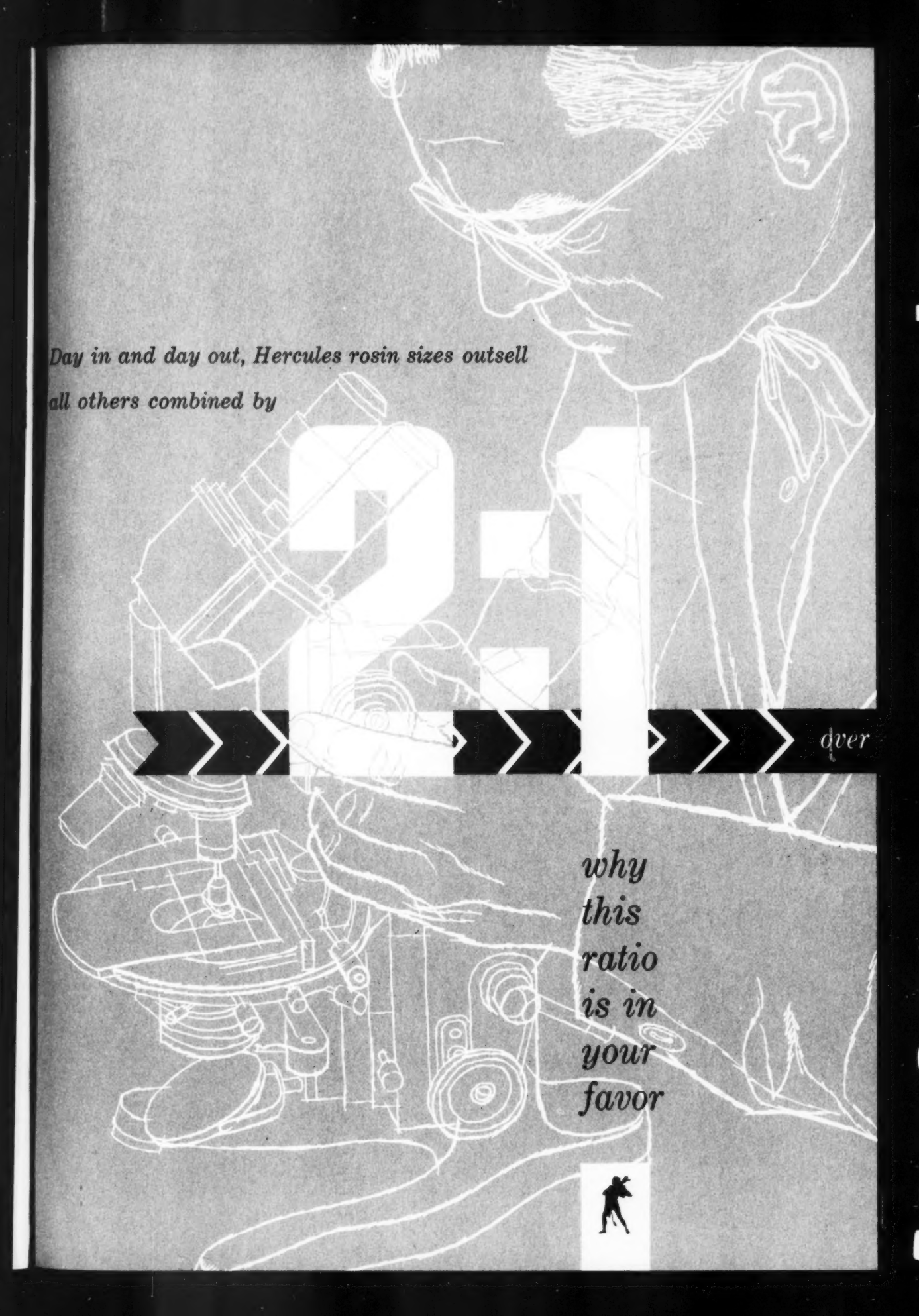
Day in and day out, Hercules rosin sizes outsell
all others combined by
2-1
over
why
this
ratio
is in
your
favor

2:1 *Day in and day out, Hercules® rosin sizes outsell all others combined by 2 to 1.*

there must be reasons for leadership

There are many sound reasons why Hercules has attained the position of leadership as the world's largest supplier of rosin sizes. For example:

2:1 Hercules maintains the world's most extensive research and technical service facilities devoted exclusively to problems of the papermaking industry. These laboratories not only point the way to new and improved papermaking chemicals, but are always at your service to assist in the solution of specific problems. They represent just one of the many reasons why mills prefer Hercules sizes 2 to 1.

Paper Makers Chemical Department

HERCULES POWDER COMPANY

Wilmington 99, Delaware

2:1 BECAUSE—UNEQUALED TECHNICAL SERVICE
A staff of more than 50 technically trained men thoroughly grounded in the cumulative experience of 40 years' mill and laboratory service to the paper industry. Such company experience results in an understanding of the requirements of the paper industry and is reflected in the variety and dependable quality of the products designed to meet them. One of these men is always as near as your telephone.

2:1 BECAUSE—HERCULES HELPS MILL OPERATIONS
Hercules has assisted in the industry's progress by designing mechanical improvements and testing equipment. The development and extensive use of the Hercules Automatic Emulsifier, for example, has resulted in major economies in the handling of rosin size.

2:1 BECAUSE—FORWARD-LOOKING CHEMICALS
From Hercules research come new products designed to anticipate your needs for improved chemical materials. Whether it is a new grade of size based on rosin or a completely new concept, you can look to Hercules for progressive leadership.

2:1 BECAUSE—UNMATCHED DISTRIBUTION FACILITIES
Hercules maintains by far the largest number of plants and strategically-located distribution points of any [illegible] size manufacturer. This is your assurance that the product you want will be delivered when and where you want it.

2:1 BECAUSE—A SIZE FOR EVERY NEED
Hercules' large number of sizing grades means that there is one available to meet practically any requirement. For unusual problems, Hercules can formulate a custom-made grade to fit your specific need. Hercules assures you the lowest possible initial cost by recommending the right grade for your specific needs.

2:1 BECAUSE—PACE-SETTING RESEARCH
The [illegible] research and technical service facilities devoted exclusively to papermaking are maintained by Hercules. The Hercules laboratories are always at the disposal of its customers in helping [illegible] and other papermaking problems.

2:1 BECAUSE—VARIETY OF PRODUCTS
Hercules is also the leading source of other high-quality papermaking chemicals. Wax emulsions, wet-strength resins, defoamers — to name but a few made by Hercules — incorporate the same degree of skilled processing improvements that are found in Hercules rosin sizes.

2:1 BECAUSE—DEPENDABLE SOURCE OF SUPPLY
Hercules is the world's largest producer and consumer of rosin. Its many facilities for producing rosin and rosin size are unmatched, thus assuring you of a thoroughly dependable source of supply.

2:1 BECAUSE—SAVINGS IN SHIPPING
Hercules has pioneered many improvements in rosin size distribution. The freight and handling savings made possible through the introduction of dry size and higher solids paste size, both in tank truck and tank car shipments, are typical examples.

PPSS-8

2:1 *Here are the facilities behind Hercules' record of leadership:*

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REGULAR ROSIN SIZE
(paste or dry)

ROSIN WAX SIZE

DEFOAMERS

PARACOL®
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KYMENE®
(Wet-Strength Resin)

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Paper Makers Chemical Department

HERCULES POWDER COMPANY
INCORPORATED

Wilmington 99, Delaware

BALE WASTE PAPER?

New Signode way is faster, easier, cheaper, safer
. . . uses your present baling press!

Faster and *easier* because fewer ties are needed per bale; the inexpensive Signode setup eliminates waste motions of reaching, twisting, splicing; strapping feeds handily from conveniently located overhead dispensers.

Cheaper because bales are 29% denser, take 43% less strap per bale, save 25% of room in storage and in trucks; steel strapping stays tight, bales hold shape without bulging and wedging in transit; steel strapping itself can be unloaded from cars or trucks quickly and neatly with a lift truck.

Safer because flexible strap ends drop down, are easy to see; no sharp ends poke at man on receiving side; bales are squarer, firmer . . . safer and neater to handle, stack, load.

It's easy to change to this new method—now used by some of the biggest balers in the country. Signode fieldmen know how to adapt it to your present baling equipment . . . are ready to work with you now. If you bale waste paper or any other compressible material or product in any quantity, call the Signode man near you, or wire or write:

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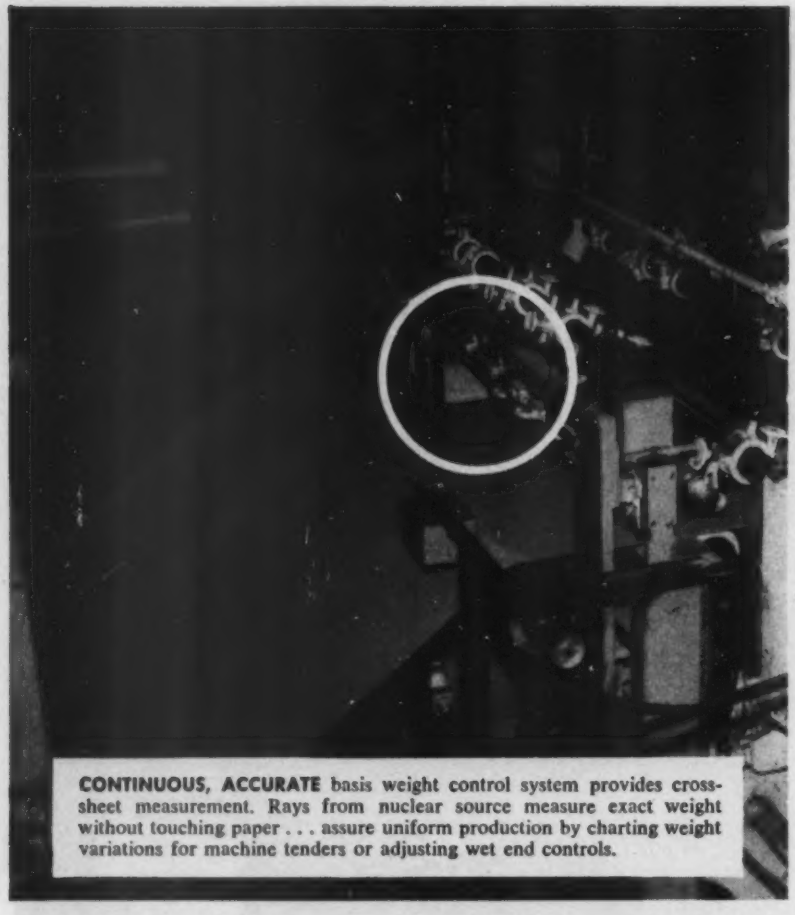
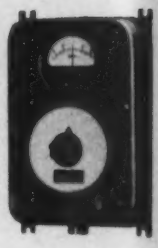
2632 N. Western Avenue, Chicago 47, Illinois

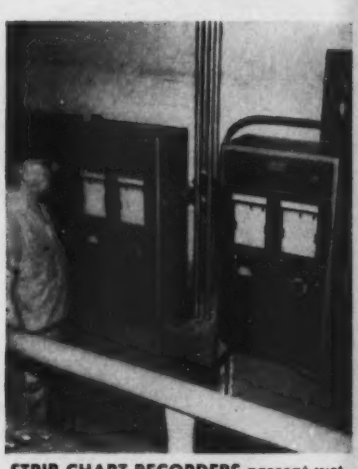
Offices Coast to Coast. Foreign Subsidiaries and Distributors World-wide.
In Canada: Canadian Steel Strapping Co., Ltd., Montreal • Toronto



CONTINUOUS, ACCURATE basis weight control system provides cross-sheet measurement. Rays from nuclear source measure exact weight without touching paper . . . assure uniform production by charting weight variations for machine tenders or adjusting wet end controls.



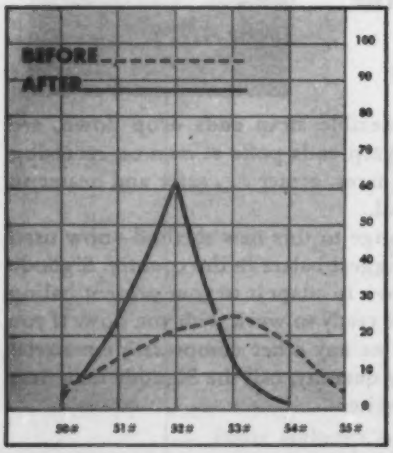
TARGET SELECTOR is adjusted to proper weight specification for each order. It then acts as constant guide for machine tender at the wet end.



STRIP CHART RECORDERS present wet and dry end weights continuously. Fast speed recorders give expanded profile readings. Console design has drawer construction for easier maintenance.

INCREASE QUALITY OF YOUR PAPER PRODUCTION

with Curtiss-Wright Control Systems



BEFORE, when hand-weighted tear sheets are used for control, weights vary greatly. **AFTER** installation of Curtiss-Wright System, uniformity sharply increases.

With Curtiss-Wright Basis Weight Control Systems installed on both wet and dry ends, it is possible to increase production on specification as much as 30% by reducing weight variations in both the machine and profile directions.

Also, wet and dry end measurement permits accurate settings on all moisture extraction equipment — assuring the sheet will enter the driers in the driest possible condition. Machine speed may be increased or steam requirements lowered.

For details of installations tailored to your needs, write Industrial Controls Dept., Curtiss-Wright Electronics Division, Carlstadt, N. J.

WEST COAST REPRESENTATIVE:
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ELECTRONICS DIVISION
CURTISS-WRIGHT
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use *Clinton*® starches

You'll like the results when you use Clinton's 3011 and 3021 starches for enzyme conversion. They're always uniform . . . always the *same* high quality.

Use them for sizing . . . 3011 and 3021 convert uniformly to give you the desired penetration . . . increased strength . . . better printing surface. Since they convert well at high solids levels they give efficient coating . . . from application to drying. And, you can count on Clinton enzyme conversion starches for economy, too.

Count on Clinton's technicians, too, for help and advice with your paper making problems. They have the "know-how" of over 30 years experience . . . and it's all yours, just for the asking.

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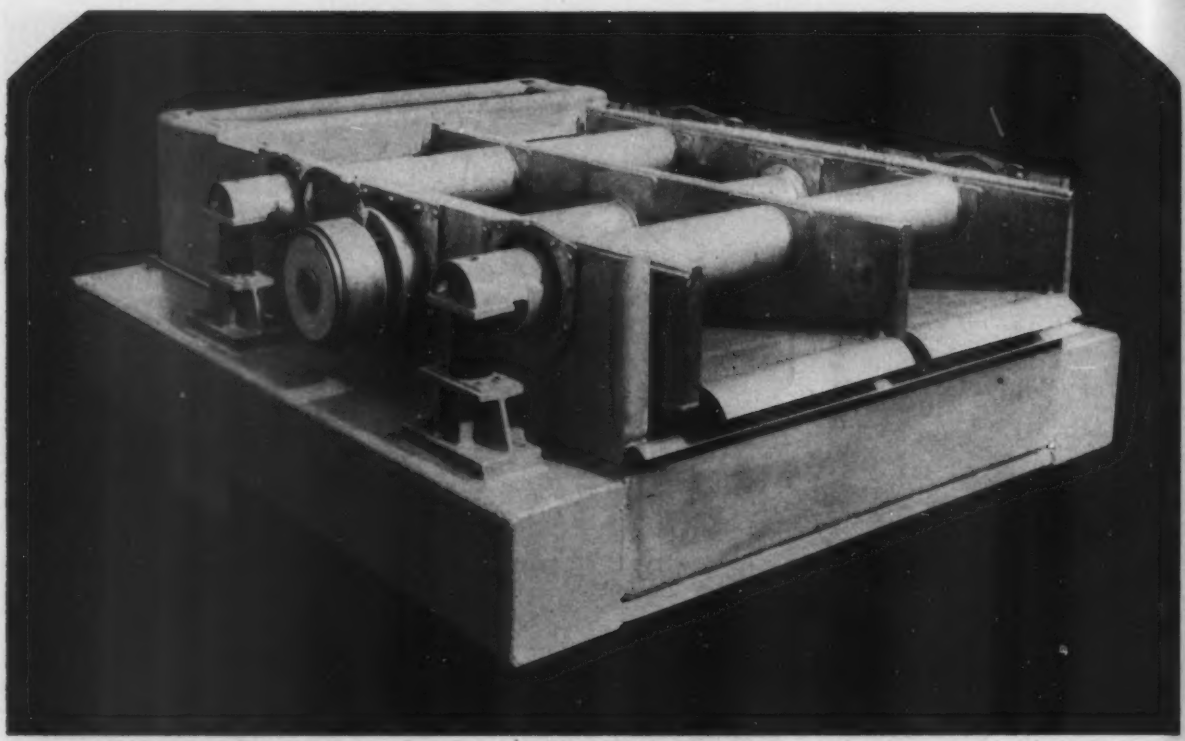
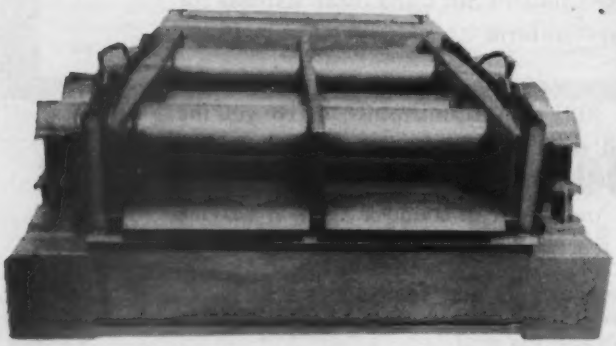
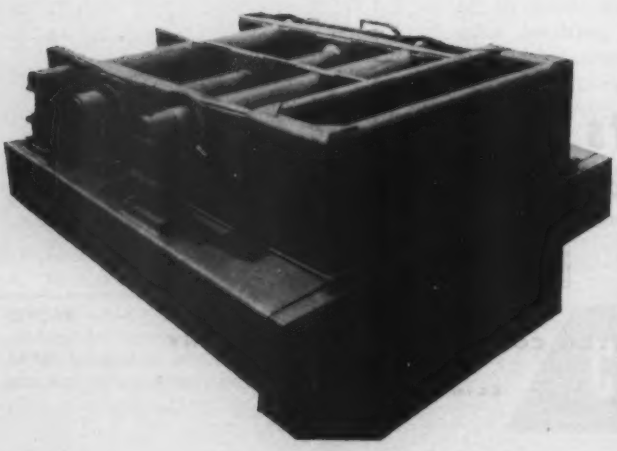
CLINTON CORN PROCESSING COMPANY

CLINTON, IOWA







IMPCO VIBRATORY KNOTTER

Here is a unit which contains several new features never before incorporated in knotters. Double wall construction of the stainless vat and center section guarantees extra long basket life. Rubber mounts support the vibrating basket as well as the vat itself, eliminating old-fashioned springs as well as minimizing vibration transmission to the building members. The built-in inlet box lends itself to subfloor piping as does the discharge. Six sectionalized screen plates are advantageous in that plate changes for various fibre clarifications are easily made. Oil mist lubrication, proper seals, and flinger rings protect the antifriction bearings against water, cooking liquors, and hot vapors.

Largest plate area is in keeping with present day peak capacities.

IMPROVED MACHINERY INC.
NASHUA, NEW HAMPSHIRE

IMPCO

In Canada,
Sherbrooke Machineries Limited,
Sherbrooke, Quebec

How to get measurable increase in densometer of your lightweight papers

Remarkably efficient film formers, Kelco's unique sodium alginates, applied at size press, lay continuous films of controllable penetration. This effectively closes up lightweight sheets, measurably raises their densometer test, improves printability, uniformity and smoothness.

Completely non-tacky, the Kelgins and Kelsize S appreciably improve machine operation and reduce "set-asides" caused by picking on the driers and calender rolls. You produce higher quality lightweight papers at faster machine speeds than ever before. If you make lightweights, the Kelgins and Kelsize S, test-proven for easy operation and high quality production, are worth your quick consideration.

YOURS ON REQUEST: Free Sample of the Kelgins and Kelsize S, *plus* new Surface Sizing Technical Bulletin. Without obligation, write today to your nearest Kelco regional office.

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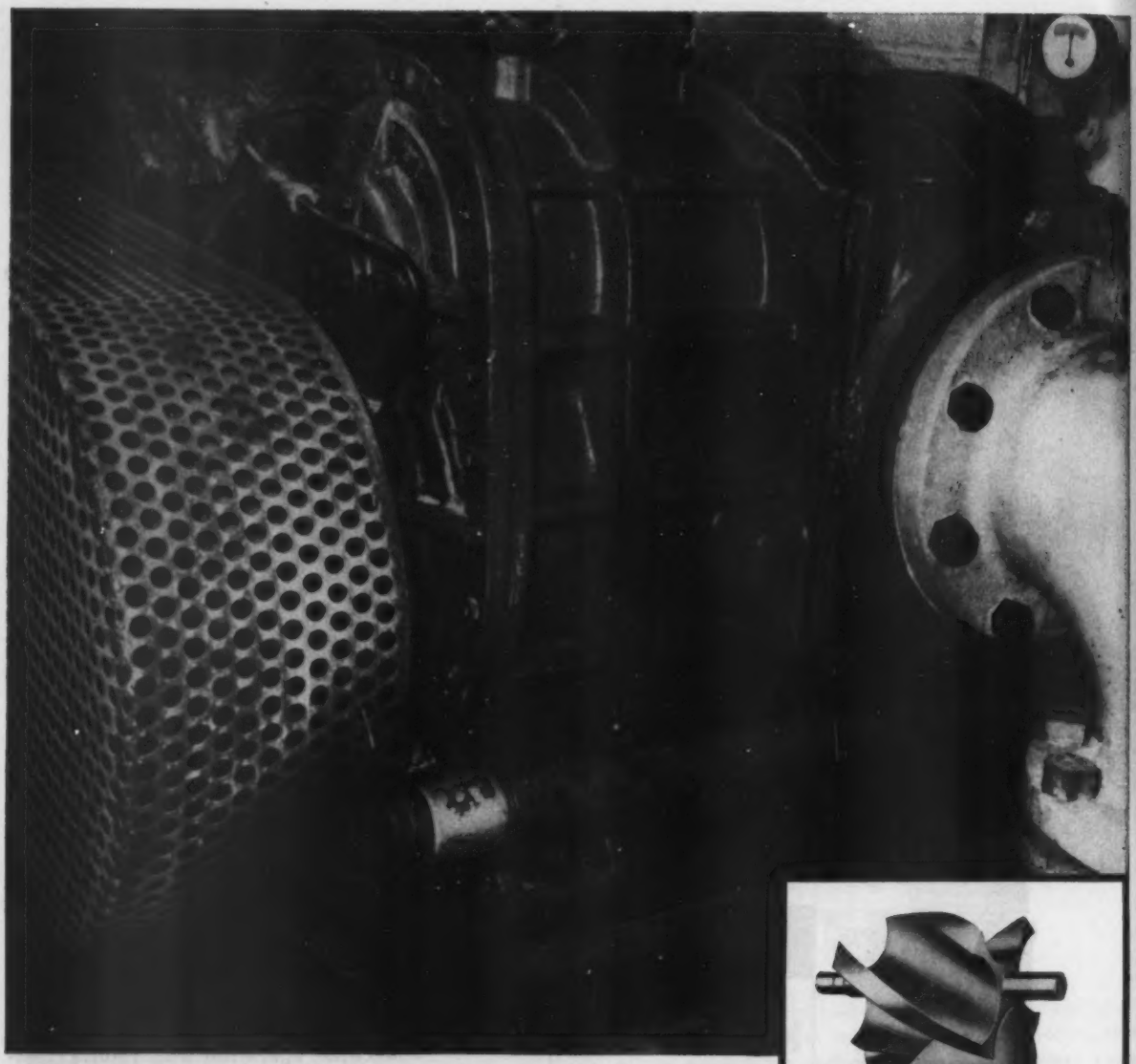


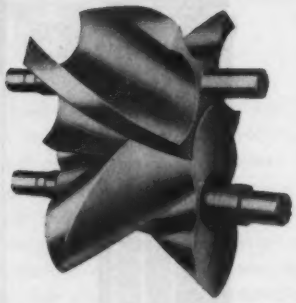
Standardaire pump solves drying and foaming problems . . . cuts maintenance for specialty paper producer

Uneven drying and heavy foaming problems resulting from vacuum fluctuations presented serious obstacles to Raybestos-Manhattan, Inc., in the production of its new, single-fiber asbestos paper.

A Standardaire vacuum pump, installed originally on a 4-month trial basis, entirely eliminated these difficulties. The unit, requiring only half of the area of the former pump, provided a constant vacuum, making possible an uninterrupted flow between the pulp vat and the final windup drum.

Now, after nearly four years of operation, often in excess of rated capacity, this unit still is in prime condition. No maintenance has been required other than lubrication at 3-month intervals.

The compact Standardaire offers greater capacity per pound of pump, with less power consumption, than other units of equal size and weight. Find out how they can help solve your problems. Write for your copy of illustrated bulletin B-154 which provides specifications and operating data.



The Standardaire's even vacuum and high capacity are the result of its exclusive cycloidal, screw-type rotors which compress air in a wide range of pressures with a minimum of internal leakage. Since rotors never touch, there is no friction, no wear or need for internal lubrication.

READ STANDARD
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BLOWER-STOKER DIVISION
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Installation of Koppers Electrostatic Precipitator at P. H. Glatfelter Co. plant, Spring Grove, Pa.

In Salt Cake Recovery at Glatfelter Paper Mill, Koppers Precipitator Exceeds Guarantee by 25%

Although tested under overload conditions, a Koppers black-liquor Electrostatic Precipitator which was installed to clean gases from a new recovery boiler at the P. H. Glatfelter Company, Spring Grove, Pa., exceeded residual specifications by 25%.

Koppers guaranteed a residual of only .10 grain per cubic foot, when the unit was cleaning gas—at the rated gas volume—with an inlet dust load of 2½ grains. During the test period, actual dust load varied as high as 3 grains; yet the Koppers unit cleaned gas to an average residual of .07 to .08 grains—exceeding guarantee by 25%.

Besides keeping your community cleaner, healthier, doing a constant public relations job for you, Koppers Electrostatic Precipitators can save you money by reclaiming valuable materials. Why not use the coupon below to get in touch with Koppers about *your* nuisance or recovery problem?

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METAL PRODUCTS DIVISION • KOPPERS COMPANY, INC. • BALTIMORE 3, Md. This Koppers Division also supplies industry with Fast's Couplings, American Hammered Industrial Piston and Sealing Rings, Aeromaster Fans, Gas Apparatus.

Engineered* Products Sold with *Service

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Gentlemen: I am interested in a review of my gas cleaning problem.

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Company .....

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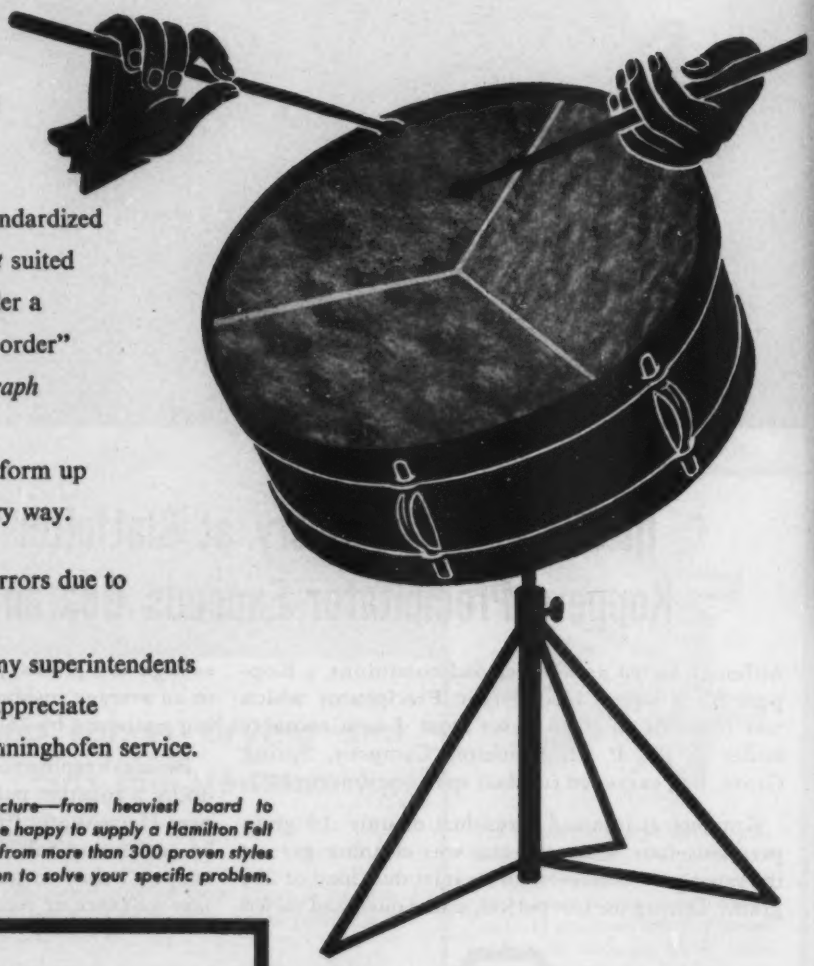
City ..... Zone ..... State .....

HAM FELTZ says,

"It makes little difference what *kind* of hat a man wears. What *really* counts is what's *under* that hat."

You can't beat HAMILTON Felts . . .

for UNIFORMITY– Time after Time after Time



—AND once you have standardized on the Hamilton Felt* *best* suited to *your* needs, you can order a replacement "same as last order" *by mail, telephone* or *telegraph* and be sure of getting a felt that continues to perform up to your expectation in every way.

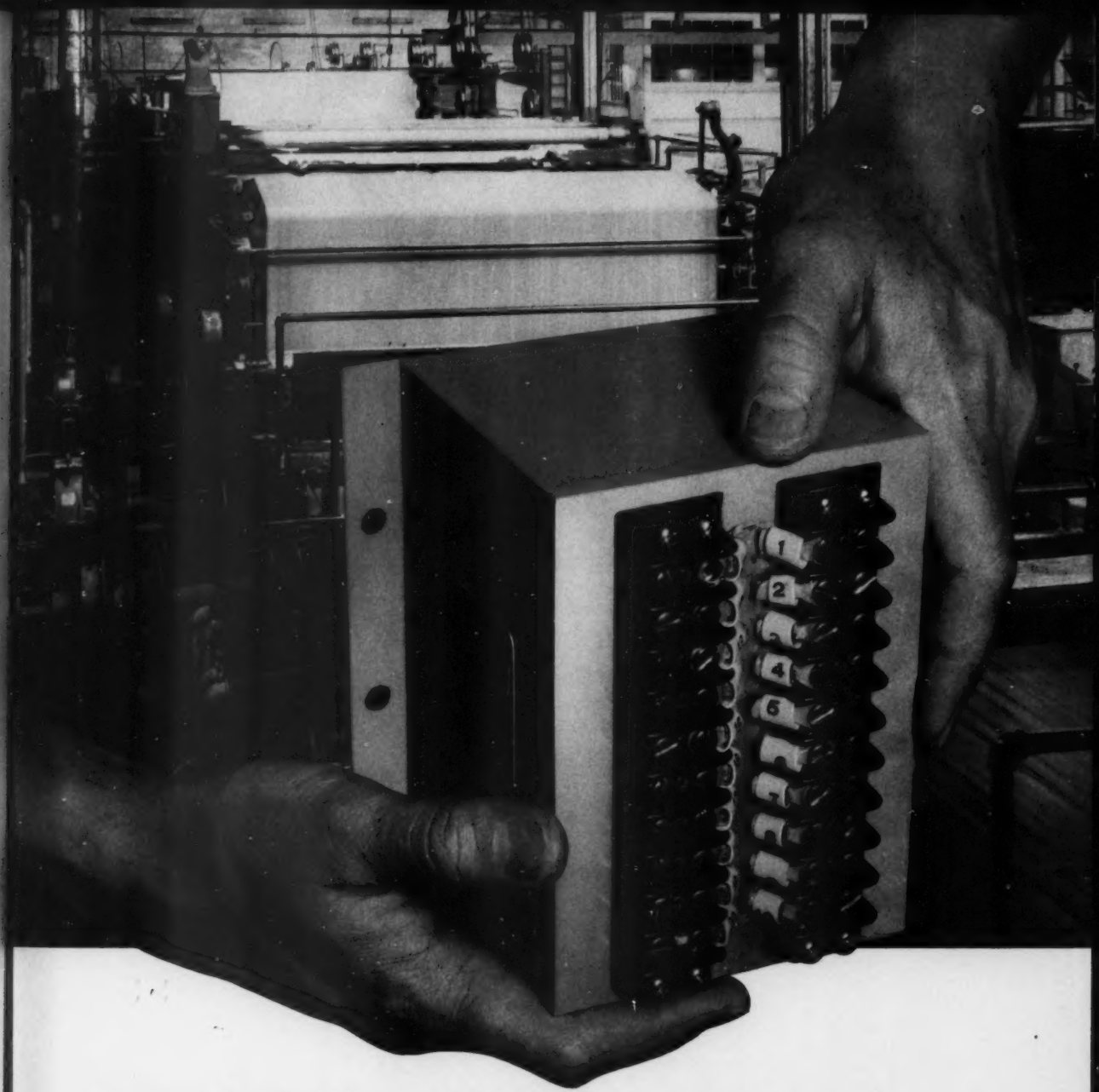
In this day of frustrating errors due to the difficulty of securing uniformity of product, many superintendents of paper and board mills appreciate this helpful Shuler and Benninghofen service.

**Whatever you manufacture—from heaviest board to thinnest tissue—we will be happy to supply a Hamilton Felt of standard construction from more than 300 proven styles . . . or design a variation to solve your specific problem.*

Hamilton FELTS

MIAMI WOOLEN MILLS
Established 1858

SHULER & BENNINGHOFEN, HAMILTON, OHIO



Availability 99.9%, or better . . .

for Westinghouse Magamp regulators on sectional drives

Westinghouse Magamp* magnetic amplifier regulators for sectional drives help boost your paper machine production by reducing down time. They provide precise, automatic control and co-ordination of different machine sections, permit increased machine speeds without sacrificing paper quality.

*Trade Mark

Here's how Westinghouse Magamp regulators allow continuous, top-speed operation of your paper machine. →

WATCH WESTINGHOUSE WHERE **BIG** THINGS ARE HAPPENING **TODAY!**

Westinghouse Exclusive!

Position and speed signal combined with Magamp cuts down time

Now you can operate your paper machine to the limits of their design, with complete confidence that dependable, accurate control will maintain paper quality.

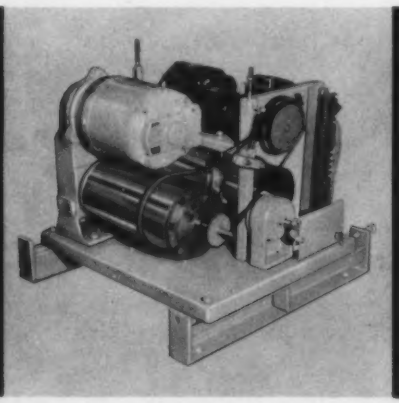
Westinghouse can offer this outstanding performance through its exclusive differential error-detecting unit which combines position and speed signal output with the Magamp regulator.

Teamed with separate position cue and speed cue, Magamp provides accurate speed matching that assures positive control of section draw over the operating speed range. Response is unusually fast.

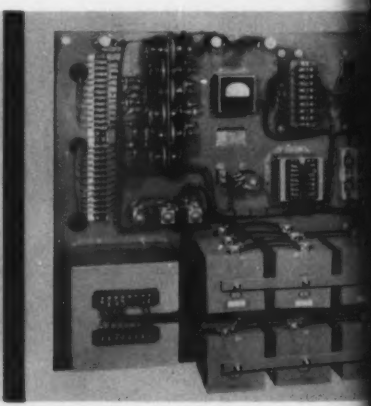
Magamp has no tubes or moving parts. It's rugged, reliable, efficient . . . requires less maintenance than any other type of regulator available. Confirmed records of more than a million unit regulator operating hours show a total availability of better than 99.95%.

Fully automatic control, arranged for convenience of the operators, assures higher production efficiency. Once set, Magamp stays set without adjustment. Elimination of line shafting, belts, pulleys and clutches reduces maintenance and outage time, results in lower operating costs. Magamp units are panel-mounted and factory-wired for easy installation.

Section drive unit is assembled complete with gearing before it leaves Westinghouse plant. Installation costs are reduced, time is saved.



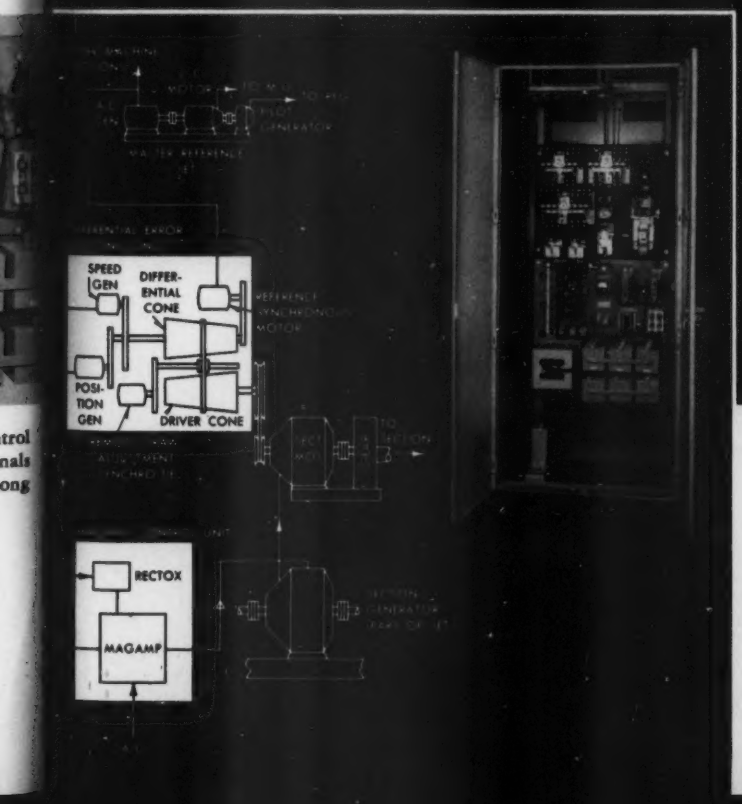
Error-detecting unit (cover removed) provides electrical position and speed signals to the Magamp panel. A minimum of moving parts assures greater reliability.



Magamp panel, located in control cubicle, amplifies electrical signals to maintain synchronism among machine sections.

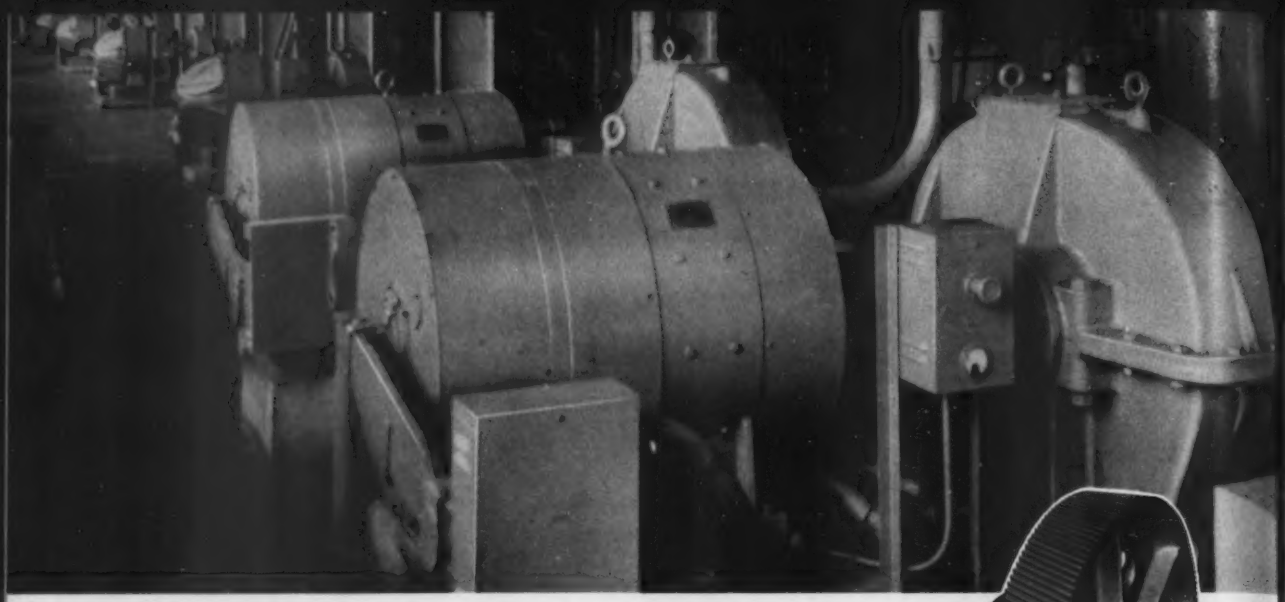
WATCH WESTINGHOUSE!

*WHERE **BIG** THINGS ARE HAPPENING **TODAY!***



Magamp regulators on this three-year-old installation have achieved better than 99.9% availability. Operator's control stations (above) and a section control cubicle (left).

How Error-Detecting Unit Operates: Individual section motor speeds are matched to a common reference master set through a mechanical differential. Cone pulleys allow for draw adjustment. The differential output shaft is connected to two small pilots which furnish electrical position and speed signals to the Magamp.



Westinghouse speed reducers, specially designed for paper mill service, are self-lubricated with single helical gears and antifriction bearings. Gear units for the wet end are supplied with dual seals, special breathers and special finishes.

Westinghouse sectional drive assembly gives you five big advantages

Of all sectional drive manufacturers, only Westinghouse makes its own gearing in addition to the electric equipment—thus providing you with one-supplier responsibility for the entire drive system. This assures you several important advantages:

Equipment selection and ordering simplified . . . only Westinghouse need be consulted.

Convenience . . . co-ordinated delivery of all equipment eliminates waiting for component shipments from different suppliers. Only one point of contact is required for servicing all, or any part, of your drive assembly.

Easy to install . . . no complicated alignment and coupling problems. Every piece of equipment is designed to fit into a unified drive assembly.

Long, dependable service . . . controls, motors, flexible couplings, speed reducers are engineered to work as a team for peak efficiency.

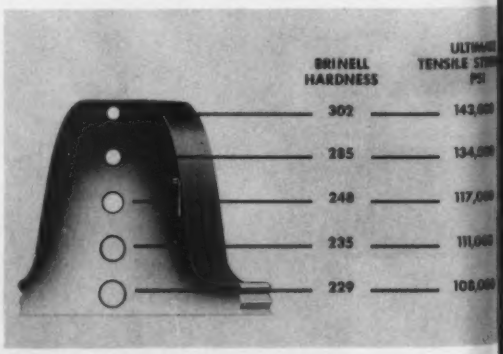
Westinghouse gearing . . . including speed reducers and gearmotors . . . also makes an excellent choice for other applications throughout your paper mill.

An experienced Westinghouse engineering team will work with your staff and consulting engineers on planning and maintenance throughout the drive assembly's lifetime.

Contact your Westinghouse sales office for further details. Ask for a copy of B-6109, *Magamp Sectional Drive for Paper Machines.* Or write, Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania. MP-3045

Single helical gear puts more teeth in action, provides greater load-carrying capacity and smooth, quiet operation. Top section of speed reducer split case can be removed for easy inspection and maintenance.

Tough outer surfaces reduce wear, resilient cores cushion operational shocks. All gears, shafts and pinions in Westinghouse speed reducers have this feature because of exclusive Westinghouse BPT heat-treating process.



WATCH WESTINGHOUSE *WHERE BIG THINGS ARE HAPPENING TODAY!*

you get more than felts

Better paper finish? Faster water removal? Increased production? Whatever *your* felt problem, it's *our* problem, too.

Our applied experience—our modern, creative research facilities—our desire to work with you . . . these are the resources and services always available to you.

As an ever-increasing number of mills are learning, you get *more* than felts from Appleton.

SISTER ACT—*Our continuous program of modernization means better methods and machines for better felts. But this program would be meaningless without people like Anne Schulze and Marie Brum . . . sisters whose combined 32 years of experience and devoted skill pay off for you on the paper machine.*

Appleton felts

1881 75 years 1956

APPLETON WOOLEN MILLS

a working partner with the paper industry

APPLETON, WISCONSIN

New Allied photographic paper mill in operation

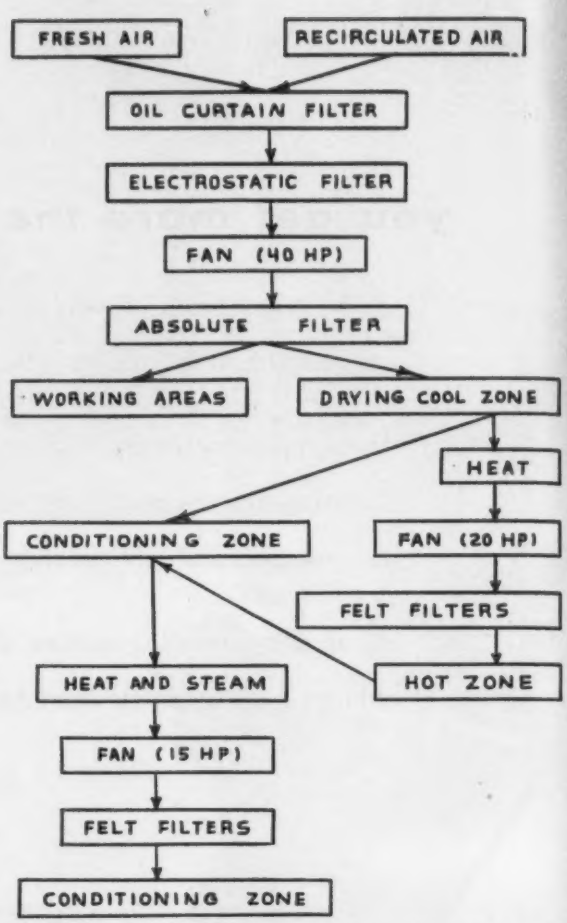


Diagram 1—Ross Engineering Corp. air system at the photographic paper mill

▶ All air is triple filtered, passing successively through the traveling curtain filter, the electrostatic filters and the absolute filter

THE NEW PHOTOGRAPHIC paper mill of Allied Paper Mills in Kalamazoo, Mich., has an output capacity of 18,000 lbs. of coated photographic paper per day. This capacity can easily be doubled, if need be, by the installation of a second coating machine, space for which has already been provided.

The raw paper stock used is a 100 per cent alpha sulfite sheet with the exception of a very light, 55-lb. stock, which has a rag content and is used on the seismograph for recording earth tremors and for photocopy uses. The weight of the dried coating applied ranges from 13-50 grams per square meter.

Practically the whole output of coated paper is sold to the photosensitizing industry, where the emulsion is applied to the paper base. The company is also sole producer of byproduct proofing paper used by publishers and the graphic arts. During the Korean War, Allied Paper supplied a high percentage of photographic paper for the armed forces of the United Nations.

Executive staff of Allied Paper Mills, who also largely participated in the planning of the new coating operation, consists of W. A. Kirkpatrick, vice president and technical director; H. B. Johnston, vice president and chief engineer; E. J. Gilman, vice president and production manager, and C. F. Chaplin, vice president in charge of sales. D. L. Huyser is superintendent of the new photographic paper operation.

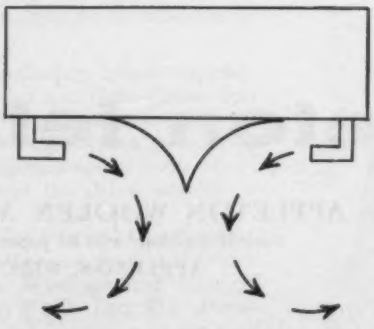


Diagram 2—Two jets and deflection of air in the drying tunnel assuring thorough general circulation through the entire loop area

Mill construction

The mill is constructed of glazed tile. The floors are of sealed hardened concrete, and the drying alley is of terrazo construction.

To insure maximum cleanliness, all air is triple-filtered and special clothing and shoes are supplied by the company to prevent personnel from bringing in dirt. As an additional step to keep possible contamination through maintenance, etc. to a minimum, special provision has been made to have nearly all motors and driving equipment of the operating area suspended from the ceiling in the basement area. Hydraulic lifts in the floor are used to load and unload each operation.

Also as part of the cleanliness program, all floors are cleaned daily with de-ionized water.

The 300-fpm air-knife coater, designed and manufactured by Allied Paper Mills and equipped with dynamatic "adjusto-spede" drive

Festooned coated paper entering and leaving the 232-ft. reversible drying tunnel that consists of cool, hot and conditioning zones

Air system

Cleanliness is one of the most essential requirements in a photographic paper mill, and this requirement is largely met through the installation of a complex and elaborate air-system which supplies 21,000 cfm of fresh air to the mill and recirculates an additional 16,000 cfm through the same system (see diagram). All air, entering or recirculated, is triple-filtered. The first filter is a conventional traveling curtain type, with filter cells automatically dipped in oil which cleans and reactivates the curtain. The oil in the sump is continually circulated and filtered to insure maximum efficiency of the filter.

From the traveling curtain filter, air enters the electrostatic filters, which remove most of the fine particles that pass through the curtain filter.

Following these is the absolute filter based on a design worked out by the Army Chemical Corps. The filtering media in this filter consists of specially treated cellulose pulp into which fine asbestos fibers have been introduced. These filters remove particles as fine as those that make up cigarette smoke.

D. L. Huyser, superintendent of the new photographic paper mill

The entire area is kept under pressure by this air system, the pressure progressively decreasing from the coating room (kept under the highest pressure) to the calender room and the basement area. To insure that the pressurization is not lost when doors are opened for access to the area, air locks are installed at strategic points. The temperature in the operating area is maintained at 75° F and humidity at 60 per cent.

Preparation of the coating composition

The coating pigment used in photographic papers is precipitated barium sulfate. It is prepared according to the following equation:

$$BaCl_2 + Na_2SO_4 = BaSO_4 + 2NaCl.$$

Left—The rewinder in the coating room winds up coated paper from the drying tunnel

Right—The 1100-fpm supercalender equipped with cotton-filled rolls

Appleton Machine Co. three-arm reel, showing dynamatic eddy current coupling and unwind roll speed reducer

View of drive end of reel showing unwind, wind-up dynamatic drives and unwind roll ready to be threaded in supercalender

Kidder Press Co. Inc. Model CW single-shaft, center-wind slitter and rewinder

Electronic control cabinets for supercalender drive and unwind and wind-up tension controls

The precipitated barium sulfate, which has an average particle size of 0.5 microns, is then separated from the mother liquor in an 18x28-in. centrifugal filter and subsequently repulped, washed, and filtered three times through the same centrifugal filter. After the final filtering operation, the pure barium sulfate contains no more than 2 ppm of chloride ion.

The feed slurry, containing 11 per cent solids, is introduced into the centrifugal filter at the rate of 10-12 gpm. The filter, operating at a speed of 2100 rpm and driven by a 15-hp, 1800-rpm motor, consists essentially of two rotating elements, the bowl and the screw conveyor. The screw conveyor rotates inside the bowl and conveys the barium sulfate, which is separated from the mother liquor by centrifugal force, toward the solids discharge ports. At the operating speed, a force of 1100 times gravity is developed.

The coating mixture is prepared by adding gelatine of the highest purity to the pure barium sulfate. This mixture is then cooked for an hour, the required quantities of glycerol, sorbitol, and butanol added, and then cooled to the coating temperature of 80° F.

The coating mixture is then pumped to the high-speed, 200-mesh vibrating screen and then to the coating machine.

Extreme cleanliness is required for the coating preparation area. Since this area is separated from the main coating and finishing operation, it is served with a separate air system that provides triple air filtration but no humidity control.

Coating and drying

The coating room houses two pieces of equipment, the air-knife coater and the rewinder. Both are of Allied Paper Mills' design and manufacture, and both are equipped with dynamatic "adjusto-spede" drives. The coater operates at 300 fpm.

The coated paper is dried in a reversible 232 ft. long festoon-type drying tunnel consisting of

(1) the cool zone supplied with dry air and operated at a temperature of 70° F

(2) the hot zone supplied with dry air and maintained at a temperature of 90° F

(3) the conditioning zone maintained at 100° F and high (85 per cent) humidity with facilities to remoisten the sheet to an absolutely uniform moisture content and to relieve stresses set up during the drying of the sheet.

The air distribution system in the drying tunnel must provide for an absolutely uniform rate of drying at all levels of the suspended sheet. This

Principal equipment and suppliers at Allied's new mill

Absolute filter (1) ..... Cambridge Corp.
Air distribution system in drying tunnel, Reflex type ..... J. O. Ross Engineering Corp.
Air-system, supplying 21,000 cfm fresh air and recirculating 16,000 cfm air, and including (1) oil curtain filter, (2) electrostatic filter, and (3) absolute filter ..... J. O. Ross Engineering Corp.
Centrifugal filter (1), 18 by 28 in., 10-12 gpm capacity ..... Bird Machine Co.
Coater, air-knife type, equipped with dynamic drive ..... Allied Paper Mills
Constant tension unwind (1), on slitter and rewinder ..... Johnstone Engineering & Machine Co.
Cotton-fill rolls (4), on super-calender ..... B. F. Perkins & Sons Inc.
Dynamatic coater drive (1), "Adjusto-Spede" type ..... Dynamatic Div. of Eaton Mfg. Co.
Dynamatic super-calender drives (3), liquid cooled, eddy-current coupling and brake; Model WC-160B rated 150 hp. at 1200 rpm; Model WC-130 rated 50 hp. at 3600 rpm; Model WB-640 rated 100 hp. ..... Dynamatic Div. of Eaton Mfg. Co.
Dynamatic rewinder drive (1), "Adjusto-Spede" type ..... Dynamatic Div. of Eaton Mfg. Co.
Electronic controls, for super-calender drives ..... Dynamatic Div. of Eaton Mfg. Co.
Electrostatic filters (2) ..... American Air Filter Co. Inc.
Fans (4), one No. 54 Type NH, and three Type NH fans, one of which with vortex control and all with shaft seals ..... Clarage Fan Co.
Motors (35), 15 - 150 hp. ..... The Louis Allis Co.
Oil curtain filters (2) ..... Continental Air Filter Co. Inc.
Pumps (4), Moyno ..... Robbins & Myers Inc.
Reel (1), three-arm revolving type, equipped with spider and pneumatic operated chucks for shaftless cores, capacity three paper logs 50-in. O.D. by 52-in. face wound on 8-in. O.D. cores ..... Appleton Machine Co.
Rewinder (1), in coating room ..... Allied Paper Mills
Screen (1), high-speed, 200-mesh, vibrating screen in coating room ..... Universal Vibrating Screen Co.
Slitter and rewinder, 60-in. Model CW, single-shaft, center wind type, 2000 fpm ..... Kidder Press Co. Inc.

is accomplished by inspirating great volumes of dryer air along with the primary supply air which enters in opposite directions through two jets and then is deflected downward (see diagram), so that a thorough general circulation is achieved through the entire loop area with a minimum variation of air conditions and movement at various points of the web.

Super-calendering

The rolls of coated paper are brought from the coating room to the finishing room, where they are super-calendered on a 64-in. nine-roll super-calender driven by a 150-hp motor and operating at 1100 fpm. The super-calender is an old machine that was rebuilt and equipped with four chilled iron rolls (of an approximate Scleroscope hardness of 72-74) and with four cotton-fill rolls.

The outstanding feature of the cotton filling (which actually is a composition of cotton and other fibers) is that it constitutes the most resilient calender roll filling obtainable. Rolls made of this filling create high quality finishes with lower than normal pressures, permitting the super-calender to operate at a nip pressure of 750 psi. This reduces the amount of crush on the paper sheet, resulting in greater bulk, higher opacity, and minimum deterioration of physical strength.

Installed in conjunction with the super-calender is the three-arm reel equipped with a three-arm spider and designed to use shaftless cores and pneumatic-operated chucks.

The function of the spider is to secure and lock into position the arms supporting the paper logs and cores. The chucks engage the shaftless core to force the opposite end of core against the fixed chucks on the arms of the spider adjacent to the positioning spider.

The three-arm reel permits loading a new paper roll into the reel while another roll is being super-calendered. When the roll is run through the super-calender, the reel is revolved one third of a revolution and the new roll comes into proper position for threading into the super-calender. The empty core, which was the unwind roll, then becomes the windup core to receive the super-calendered paper from the stack.

The new three-arm reel installed at Allied Paper features the following improvements:

1. The welded stress normalized steel end frames accommodate the sizes and weights of logs of paper up to 50-in. diameter by 125-in. face weighing up to 6000 lbs. and permitting operation at speeds up to 1200 fpm.
2. Provisions have been made for manual or power adjustment of center-to-center distance of arms to accommodate a wide range of trim widths.
3. A completely pneumatic and electric interlocking system protects the equipment from damage through errors of manipulation.
4. Electric or electronic web tension controls are provided.
5. The operator's controls are located at the reel within easy access.
6. All portions requiring lubrication are equipped with oil-tight enclosures.
7. A compound table top on the oil hydraulic roll lift permits quick loading of rolls to and from the stack.
8. The absence of belt drives eliminates dust hazards.

The super-calender is driven by three dynamatic eddy-current drives. The main drive is a Model WC-16OB liquid-cooled, eddy-current coupling with an eddy-current brake. It is rated 150 hp at 1200 rpm. The wind-up drive is a Model WC-130 liquid-cooled, eddy-current coupling rated 50 hp at 3600 rpm. The unwind drive is a Model-640 liquid-cooled, eddy-current brake rated 100 hp maximum heat dissipation.

The main drive is controlled through a dynamatic electronic control, and both the wind-up drive and the unwind brake controls are coordinated with the main drive control to follow any change in speed set by the main drive. The wind-up and unwind drive controls are of the multi-range electronic tension control type, which insures constant tension in the face of varying roll diameter at any delivery speed and provide automatic compensation for changing delivery speed. Stalled tension is also provided on the wind-up stand drive only.

The super-calendered rolls are then taken to the 60-in. CW Model slitter and rewinder. This machine is a single-shaft, center wind type equipped with shear-cut type slitting knives and used in conjunction with a constant-tension unwind unit.

While the slitter and rewinder is designed for operation at web speeds of up to 2000 fpm, it is run at a speed of only 150 fpm to facilitate inspection and removal of any paper defects.

Packing

Finished rolls are sealed air-tight and packed in special shock resistant materials. Due to the high monetary value of the product, every precaution is taken to prevent damage in transit or in handling at the receiving end.

Each roll of product is sampled and thoroughly tested photographically before being passed for shipment and the entire operation is checked constantly for any trace of radio-active contamination. Raw materials used are subjected to the same rigid controls.

Neutral sulfite semichemical pulping — II

Effect of variables on chemical consumption*

MARSHALL E. FINDLEY**
and W. J. NOLAN†

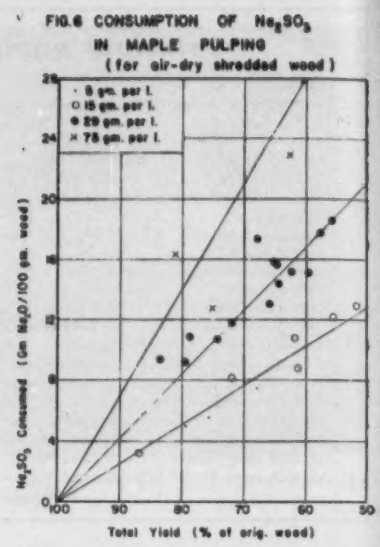


FIG. 6 CONSUMPTION OF Na_2SO_3 IN MAPLE PULPING
(for air-dry shredded wood)
5 gm. per l.
15 gm. per l.
29 gm. per l.
75 gm. per l.
Na_2SO_3 Consumed (Gm Na_2O/100 gm. wood)
Total Yield (% of orig. wood)

▶ Concentrations should be kept below 20g. per liter of Na_2SO_3, expressed as Na_2O, or at the lowest level that will not conflict with the economics of chemical recovery

IN NSSC PULPING the consumption of cooking chemical is an important economic factor, since the consumption is relatively high, and there are many difficulties to overcome in the recovery of chemicals. For this reason a study of the variation of chemical consumption with cooking conditions was undertaken. In analyzing the waste liquors from maple pulping, it was found that the sodium bicarbonate results were very erratic. Since sodium carbonate and bicarbonate are used only as buffers and are relatively inexpensive, it was decided to deal only with sodium sulfite consumption, the data for which were more consistent.

The chemical consumption data for maple pulping, calculated from the data of Tables I and II, are listed in Table IV. A graphical presentation of these data is shown in Fig. 6. A similar tabulation of chemical consumption for eucalyptus and graphical representation may be found in Table V and Fig. 7, respectively.

In Fig. 6 the Na_2SO_3 consumption in maple pulping, as a percentage of the original wood, calculated as Na_2O, is plotted against pulp yield. This figure includes data at various temperatures, but, since little variation was found with temperature, the points are differentiated only with respect to concentration.

The consumption rate for 5 and 15 gm. per l was essentially the same, with only small deviations from a linear relationship with yield. At the higher concentrations of 29 and 75 gm. per l., the consumption definitely increases with concentration and seems to become more erratic. The consumption rate, expressed as gm. Na_2O per gm. of wood dissolved, was found to be 0.257 for pulping at 5 and 15 gm. per l. At 29 gm. per l. this consumption rate increased to 0.420, while at 75 gm. per l. it was 0.693. The reason for this increase in consumption rate is beyond the scope of this investigation, but it seems likely that it could be due either to equilibrium or adsorption phenomena, or to organic interference in the analytical procedure.

From a standpoint of economy of chemical utilization it appears that concentrations below 20 gm. Na_2SO_3 per l., expressed as Na_2O, should be most desirable. It has previously been shown (2) that reaction rate is affected in only a minor way by concentration. Therefore, in the case of in the neighborhood of 15 gm. per liter.

Fig. 7 shows the relationship between Na_2SO_3 consumed and total yield in eucalyptus pulping. The data are rather scattered, but a straight line seems to fit the distribution of the points. This line indicates a consumption rate of 0.258 gm. Na_2O per gm. of wood dissolved. This rate is practically the same as the value found for 15 mg. per l. liquor in the pulping of maple. The initial concentration in the eucalyptus cooks was about 19-20 gm. per l. total Na_2O or 15-16 gm. per l. of Na_2SO_3 as Na_2O, indicating that the chemical consumption for this wood is in line with that of maple.

It should be remembered that in the eucalyptus cooks the chemical application, as per cent of original wood, was only 10-12 per cent as compared to very large excess of chemical for most maple cooks. The fact that the consumption rate for eucalyptus was found to be compatible with the rates for maple pulping indicates that initial concentration, rather than average concentration during the cook, might control the magnitude of chemical consumption. However, considerable more work should be done, in which per cent chemical is varied over a wide range, to verify this statement.

Reaction kinetics of eucalyptus pulping

In an earlier investigation (2) of the reactions involved in maple pulping, it was found that the reaction followed a kinetic equation based on two simultaneous or consecutive first-order reactions. The relationship is:

$$Y = Y_{Ao}\, e^{-kAt} + Y_{Bo}\, e^{-kBt} + 43,$$

where $Y_A = Y_{Ao}\, e^{-kAt}$ and
$Y_B = Y_{Bo}\, e^{-kBt}$

These equations indicate that the

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Table IV—Consumption of Na_2SO_3—Air Dry Shredded Maple

Cook No.	Temp. (°C.)	Vol. Liquor per 100 gm. O. D. Wood (l.)	Concentration of Na_2SO_3 (gm. Na_2O per l.) Initial	Final	Pulp Yield % of Wood	Na_2SO_3 Consumed % of Wood
1196	170	3.88	4.96	3.68	79.5	4.97
1197	170	3.88	4.96	3.52	75.6	5.60
1200	170	3.88	4.96	3.04	67.8	7.46
1142	170	2.52	15.10	13.80	86.8	3.28
1144	170	2.52	15.10	11.90	71.9	8.07
1147	170	2.52	15.10	10.80	61.8	10.8
1156	178	2.45	15.20	13.00	70.9	5.4
1158	178	2.45	15.20	11.60	61.2	8.81
1159	178	2.45	15.20	10.70	57.0	11.02
1150	186	2.43	15.20	11.50	64.3	8.99
1152	186	2.43	15.20	10.20	55.5	12.15
1153	186	2.43	15.20	9.90	51.5	12.9
1218	170	3.09	29.00	26.00	83.5	9.28
1219	170	3.09	29.00	25.50	78.7	10.8
1220	170	3.09	29.00	25.20	82.1	11.73
1221	170	3.09	29.00	24.80	65.9	12.97
1222	170	3.09	29.00	24.10	62.2	15.13
1223	170	3.09	29.00	24.10	59.5	15.13
1225	162	3.04	29.00	26.00	79.5	9.13
1226	162	3.04	29.00	25.50	74.4	10.63
1228	162	3.04	29.00	23.30	67.8	17.3
1229	162	3.04	29.00	23.80	65.0	15.8
1232	178	2.98	29.00	24.20	64.3	14.3
1234	186	2.95	29.00	23.70	64.8	15.63
1235	186	2.95	29.00	23.00	57.6	17.70
1236	186	2.95	29.00	22.70	55.6	18.58
1168	170	2.56	75.00	68.10	81.0	15.67
1171	170	2.56	75.00	66.10	62.5	22.80
1165	178	2.53	75.00	70.00	75.1	12.64
1167	178	2.53	75.00	64.00	60.2	27.80

Table V—Consumption of Na_2SO_3—Eucalyptus

Cook No.	Moisture in orig. Chips (%)	Vol. Liquor per 100 gm. O. D. Wood (l.) Initial	Inc. H_2O in wood	Conc. of Na_2SO_3 in Liquor (gm. Na_2O/l.) Initial	Final	Na_2SO_3 Consumed per 100 gm. O. D. Wood (gm. Na_2O)	Pulp Yield (%)
1415	32.8	0.486	0.535	14.03	2.4	6.22	80.2
1420	31.4	0.583	0.629	14.32	9.8	2.84	78.1
1428	32.0	0.570	0.617	15.81	8.2	4.69	85.0
1430	32.0	0.570	0.617	15.81	7.8	4.93	81.7
1423	31.3	0.552	0.598	15.80	7.1	5.20	78.2
1425	31.3	0.552	0.598	15.80	3.5	7.36	72.0
1492	29.9	0.618	0.661	12.25	4.2	7.31	69.2
1493	29.9	0.618	0.661	12.25	3.2	7.97	67.3
1502	29.7	0.608	0.650	12.25	3.0	7.96	67.8
1503	29.7	0.608	0.650	12.25	2.2	8.49	66.5
1433	41.1	0.586	0.656	14.05	7.1	4.56	75.5
1435	41.1	0.586	0.656	14.05	1.6	8.17	68.2
1513	31.4	0.687	0.733	15.27	3.8	8.41	69.8
1518	17.5	0.687	0.707	12.53	3.3	8.86	68.3

cooking data can be represented as the sum of two straight lines on semi-log graph paper, plotting yields vs. cooking times. A graphical analysis of the maple pulping data showed this to be true.

A similar analysis of the eucalyptus pulping data was undertaken, although the data are quite meager. A thorough analysis would require the investigation of several temperatures and longer cooking times than those involved in this study.

Extrapolation of the straight line in Fig. 3 to the point where it crosses the zero axis for lignin yield shows an intercept of 43 per cent yield for green shredded eucalyptus, identical to the value for maple. The yield curves for shredded eucalyptus at temperatures of 186 and 193°C. (Fig. 1) were modified by subtracting this value of 43 from each yield value. These modified yield curves are shown as the solid curves at the top of Fig. 8.

From these two modified yield curves, values of Y_A were estimated, as shown by the dotted lines in Fig. 8. These lines indicate a Y_{Ao} value of 36 per cent. Therefore, $Y_{Bo} = 100 - 43 - 36 = 21$ per cent. The Y_B values for specific cooking times were arrived at by subtracting the Y_A value at each cooking time from the corresponding value of total yield − 43, in Fig. 8. The dot-dash lines in Fig. 8 appear to fit the plotted values of Y_B quite well.

This graphical representation of the eucalyptus data indicates that the same variables control the pulping of eucalyptus as were found to control maple pulping. It was found, in maple pulping, that temperature and chip size were important in determining reaction rate, while concentration had only a minor effect.

FIG. 7 CONSUMPTION OF Na_2SO_3 IN EUCALYPTUS PULPING

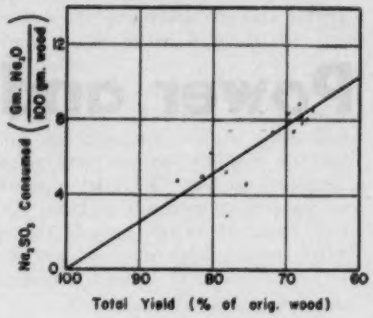
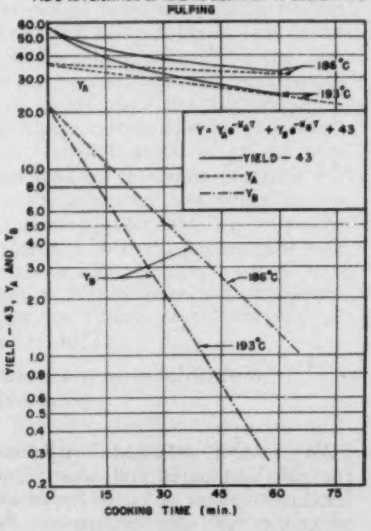


FIG. 8 APPLICATION OF KINETIC EQUATION TO EUCALYPTUS PULPING



Conclusions

Use of high initial concentration of Na_2SO_3 will result in high chemical consumption without any appreciable effect on reaction rate. From theoretical considerations alone, initial concentration should be below 20 gm. Na_2SO_3 per liter, expressed as Na_2O. However, the economics of chemical recovery may prohibit the excessive dilution accompanying low initial concentration. At any rate, the lowest possible initial concentration should be used.

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Power and steam for paper mills*

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Cost of steam and power in an integrated pulp and paper mill varies between $12 and $25 per ton of saleable paper, representing as much as 20 per cent of the sales price of newsprint, or as little as 6 per cent of the sales price of certain quality papers

POWER AND STEAM installations for pulp and paper mills deserve an important place in mill expansion programs, not only because of the need to obtain lowest costs and the highest degree of dependability, but to obtain uniformity in voltage, frequency and steam pressure, which in turn represents increased production and improved quality of product.

Steam and electric power per ton

The figures in Table I represent average values of steam and electric power usage per ton of bone-dry pulp or groundwood or per ton of salable paper. They are not necessarily the highest or the lowest values obtained in the industry but are listed nevertheless to show their order of magnitude.

Table I indicates that a newsprint mill requires approximately 50 per cent more power but only one-half as much process steam as the sulfite or sulfate type of integrated pulp and paper mill. To state it another way, the figures indicate that a newsprint mill might require 5 lb. of process steam per hour for every kilowatt hour it consumes, while a sulfite or sulfate mill requires nearer to 16 lb. of process steam per kw and accordingly is able to generate a larger proportion of its power requirement as by-product power.

Table I
Steam and power per ton of product

		Newsprint Mill		Sulfite or Sulfite Mill	
Electric Power to Process-Kilowatt hour/Ton	Per Ton Of	From	To	From	To
1. Groundwood Pulp Mill	BD—GW	1,250	1,350	—	—
2. Chemical Pulp Mill	BD—Pulp	300	500	300	500
3. Mixture 1 & 2	BD—Pulp	1,050	1,150	—	—
4. Paper Mill	Sales	450	700	600	1,000
5. Integrated Pulp & Paper Mill	Sales	1,550	1,900	900	1,500
Steam to Process (Excluding Steam for Power) Lb/Ton					
6. Groundwood Pulp Mill	BD—GW	300	400	—	—
7. Chemical Pulp Mill	BD—Pulp	5,000	6,000	8,000	12,000
8. Mixture 6 & 7	BD—Pulp	1,250	1,800	—	—
9. Paper Mill	Sales	7,000	9,000	8,000	10,000
10. Integrated Pulp & Paper Mill	Sales	8,300	11,000	16,000	22,000

Cost of steam and electric power

The cost of steam and power in an integrated pulp and paper mill will vary from about $12 to $25 per ton of salable paper. This, however, can represent as much as 20 per cent of the sales price, in the case of newsprint, to less than 6 per cent of the sales price in certain paper—either high-grade or paper to which value has been added beyond the paper machine reel. Mills vary widely in this respect.

*Abridged from a paper presented at the 37th annual convention of the APPMSA, Lake Placid, N. Y., June 12-14, 1956.

Factors influencing steam and power costs

Some of the factors influencing costs of power and steam per ton of paper in the three classifications of pulp and paper mills are inherent in the type of paper produced. Some papers require a pulp bleach plant, and the mill makes the chlorine required for bleach. Other mills purchase all or part of it. This not only affects kilowatt-hours per ton of paper, but the extent to which hot water is used as well, and this in turn is reflected in pounds of steam per ton of paper.

If the mill produces coated paper, a considerable portion of the tonnage derives from the coating, and less steam and power are required compared to a non-coated product.

If the paper is produced on machines employing Yankee-type dryers, such as tissue machines, higher dryer steam pressure is required, and by-product power generation from process steam is less than would be obtained at lower dryer pressures.

The geographic location of the mill also has quite an influence on power and steam costs per ton of paper. Fuel costs vary principally on account of transportation distance of the mill from the fuel source, whether as freight or as pipeline expense. Steam requirements for heating buildings and heating process water are also affected by the location of the mill, whether it is in a northern or a southern climate.

If nuclear reactors should prove advantageous as a source of heat, the proximity of a paper mill to a source of fuel, or a low-cost hydro-power system may not be as important a consideration as it has been in the past.

When referring to the cost of power per ton of paper, another factor might be mentioned here that sometimes affects it, i.e. the steam turbine-driven paper machine. In some mills, if motor drive were to be employed instead of a steam turbine, an additional 120 kilowatt-hours would be charged as power per ton of paper. This is chiefly a matter of accounting procedure, but some of the spread shown in line 4 of Table I is due to the type of paper machine drive.

Trend to higher steam pressures and temperatures

Steam is required in pulp and paper mills for cooking or digesting wood, evaporating black liquor, chemical recovery, drying paper, heating water, heating buildings, steam turbine drives, and the generation of electric power.

In order to offset the ever-increasing cost of equipment and plant construction and to meet competition in the industry, it has been necessary to obtain the highest possible rate of production from paper mill equipment. In the manufacture of certain grades of paper this has required higher dryer pressures. Where paper machine dryers are supplied with exhaust steam from power-generating equipment, if back pressure is raised, initial pressure must be raised also if the same amount of by-product power is to be obtained. For example, if exhaust pressure is 25 psi with initial pressure of 600 psi, and exhaust pressure is raised to 35 psi, for the same by-product power generation, initial pressure must be increased to 725 psi.

Fuel selection

Depending on availability and transportation costs in the area where the mill is located, the fuel required for the generation of steam in a pulp and paper mill is normally coal, fuel oil or natural gas.

Sulfate-type pulp mills obtain a large amount of steam from chemical recovery boilers averaging 10,000 to 11,000 lb. per ton of pulp. Some sulfite mills possibly influenced by the mill effluent disposal problem and operating as magnesium base sulfite mills, are now obtaining steam from the recovery systems.

Where coal proves to be the most desirable fuel, in most of the newer installations, it is burned either as pulverized coal or by means of spreader stokers with continuous ash discharge or by cyclone firing system. Pulverized fuel firing systems can burn coal with a wide range of ash-softening temperatures, depending on furnace design, whether with slag bottom for low ash-softening temperature coal or dry bottom for high ash-softening temperatures. The spreader-stoker is best suited to medium or high ash-softening temperatures and the cyclone firing system for low ash-softening temperatures.

In some paper mills a choice may be made between coal and oil, and in some instances natural gas is available. In a new plant the fuel to be selected depends on a number of considerations other than cost per 1000 lb. of steam, although this is a very important one. Over any period of 10 or more years in any area where coal and oil are both available and in supply on a cost per million Btu basis, oil will cost slightly more than coal. If oil were to be cheaper than coal, supply and demand would readjust prices to restore an economic balance.

Dependability of supply is of great importance since a loss of mill production due to insufficient fuel supply would soon offset other cost considerations.

Coal usually requires the installation of dust collectors, which minimize ash nuisance due to stack discharge but add to the ash disposal problem after the dust is collected. This problem becomes more acute as present disposal areas become filled and new ones are farther away from the boiler plant.

A new system of refining crude has recently been developed by some of the larger oil companies in which the residue from the refining process, instead of being a liquid fuel, is petroleum coke produced by the fluid coking process. This fuel is practically free of moisture and ash and is almost pure carbon. It requires an auxiliary fuel such as oil or gas to maintain ignition. To some degree it will become attractive as a boiler fuel in oil refining areas, but it is impossible to predict with any certainty to what extent it will affect the availability of Bunker C and heavier fuel oil residues for future steam generation in paper mills.

Balancing non-coincident demands

Economic studies comparing various plans for generating power, or a combination of generated and purchased power, are necessarily based on averages, say for summer months and winter months. However, the extent to which steam and power demands shown as averages are coincident is a difficult matter to determine, and for the future any assumption as to load coincidence is purely a guess. Accordingly, some balancing device must be employed such as: (1) steam condenser on turbine exhaust; (2) pressure-reducing valve bypassing a steam turbine; (3) hydro-power water storage, and (4) purchased power.

Extraction condensing vs. non-condensing

These two general types of steam turbine generating plants cover a number of design variations ranging from so-called topping units of the straight non-condensing type to triple extraction condensing units. However, we shall refer here to the single extraction condensing unit vs. the straight non-condensing type. In the case of the extraction condensing unit, the balancing device is provided in the condenser which represents some heat loss, although if used for heating mill water the loss is minimized.

The straight non-condensing turbine plant requires some other form of balancer between power and steam fluctuations. If an outside source of purchased power is available, it may prove to be the most economical, otherwise a pressure-reducing valve with or without desuperheater may be employed. This reducing valve is in parallel with the non-condensing turbine generator, and in order to provide "cushion" to take care of non-coincident demands, some steam is continually discharging through the pressure-reducing valve. This represents no BTU loss, such as occurs in the condenser, but it does represent a loss of potential energy that would otherwise appear as by-product kilowatt-hours.

Whether it will be more economical to take load swings with an extraction condensing turbine generator unit, allow the public utility to take it on purchased power, or possibly a company-owned hydro-electric power system to take it on water storage capacity, is a matter for investigation and further study in each instance.

Single vs double extraction turbine generator units

In the average paper mill the writer is of the opinion that there should be not more than three steam pressures at the power plant, and in many cases not more than two, not counting the vacuum pressure in the condenser.

The pressure at which steam is required for the digesters, or in some cases the Yankee dryers, determines the highest pressure at which steam is required in the mill for process purposes.

In most mills more steam is required at lower pressures of 30 to 50 psi, for paper machine dryers and heating, than at higher pressures. However, the economics of steam distribution at low pressures should be investigated since the additional cost of the relatively large, low-pressure steam piping, plus the cost of the additional turbine extraction mechanism, may not be justified by the savings due to the additional by-product electric power. In the case of an extraction condensing turbine generator, the difference in economy between a single automatic extraction and a multi-automatic extraction turbine appears in the quantity of steam to the condenser, which will be greater for the same load with the single automatic extraction machine than with a double extraction unit. However, if condenser steam can be utilized in whole or in part in heating mill water, condenser loss is reduced and it will be difficult to justify the increased cost of the multi-extraction turbine-generator unit, plus the added cost of the larger distribution piping to the mill.

Purchased power

In some cases where a mill is faced with a partial replacement of an existing power plant or where a small increase in power-demand is not sufficient to justify an addition to the present plant, or where purchased power rates are favorable, it sometimes pays to buy a block of power, especially where heat is being wasted to condenser circulating water.

Where parallel operation with an outside source is practicable, it permits the purchased power to be base loaded, with the large swings taken by the mill power plant if feasible. This penalizes the mill power plant, but the cost is not as great as it would be if the purchased power source were to take the load swings. If the mill power plant is not capable of taking load swings, the public utility of necessity will have to absorb them.

Another advantage of parallel operation with a larger public utility system is that the frequency control exercised by the utility is imposed on the mill power generators, and speed control of paper mill machinery tends to improve quality of product especially on high-speed paper machines.

In order to avoid loss due to incoming power interruptions it is desirable to obtain power from more than one substation or transmission line. Also, less important mill feeders should be scheduled as expendable load, in case some mill load has to be dumped.

St. Croix Paper's power extension

On completion of the installation of No. 4 paper machine at the Woodland, Maine newsprint mill of St. Croix Paper Co., it is estimated that the peak electric load will be 33,000 kw. Of this total, normal hydropower will supply 10,000 kw, the existing steam plant 10,000 kw, and a new power plant extension now under construction 13,000 kw.

The new power plant extension consists of (1) a 12,500-kw condensing steam turbine generator unit with initial steam supplied at 850 psi and 900°F with four uncontrolled extraction openings (the generator is 13,520-kva, 60-cycle, 13,800-v) and (2) a 125,000-lb./hr. cyclone-fired steam generating unit for 875 psi, 900°F. with feedwater at 393°F. This unit is of pressurized furnace design with Ljungstrom air heater and no economizer. The guaranteed efficiency with Minto coal is 90 per cent. The furnace heat release ratio per sq. ft. of equivalent projected radiant surface is 60,000 BTU per hr.

Before a decision was made on the type and size of the boiler and turbine generator units, and pressure and temperature at which they would operate, a number of plans were tested for relative economy with the power and steam demands required for the increased paper production.

The plan adopted, comprising a straight condensing, steam turbine generator unit, with initial steam conditions of 850 psi and 900°F. operating on a regenerative feedwater cycle, showed the best economy based on the following facts:

(1) No public utility power company in this area has transmission lines or other facilities to furnish power at an attractive rate.

(2) No additional hydro-electric power development by St. Croix in this area could generate power at an attractive price.

(3) A sufficient portion of the existing power plant, which operates at 400 psi and 700°F. will be capable of supplying all mill process steam and some by-product power for a period of not less than 20 years. The largest portion of the existing power plant is not over three years old.

(4) The average price of fuel during the life of the new plant will not be less than 50 cents per million BTU.

If it were not for the fact that the existing power plant, with relatively new equipment, is capable of generating by-product power with the additional process steam required, it would have been possible to show some worthwhile saving by installing an automatic extraction, condensing turbine generator, but studies of various plans to accomplish this failed to show any advantage. In this respect St. Croix presents an unusual situation.

It is believed that future mill increases will exceed the capacity of the 400-psi plant to serve them, and the next step will probably show advantages for a single, automatic extraction condensing turbine generator unit operating at 850 psi with extraction at 150 psi.

The new unit station heat rate, on a generated basis, is estimated at 11,000 BTU per kilowatt hour.

With coal costing 46 cents per million BTU, the fuel cost per kilowatt hour is 5.5 mills, and based on 7500 hours of mill operation, fixed charges, labor and maintenance give a total estimated cost of 9 mills. This is at an annual load factor of 80 per cent.

Inorganic coatings and coating adhesives

Part IV in the series on the Technology of Paper Coating

INORGANIC COATINGS are generally applied "on-the-machine" by tub sizing or by some of the methods described in Part II (see June 1956 issue). Roller coating is the favorite means of on-the-machine coating in modern paper mills. The obvious advantage of applying such coatings on the machine is that the water phase of the inorganic coating can be removed on the same equipment on which the paper is dried, thereby eliminating an additional handling step that would be required when the paper is coated separately.

An inorganic coating constitutes a combination of a pigment and an adhesive dispersed in water, usually with the aid of dispersing agents. Although the adhesive may be organic in nature, the coating is still called inorganic because of the pigment it contains.

Ordinarily, inorganic paper coatings, which are also termed coating colors, are prepared at solids contents, of 70-80 per cent. A typical coating color might have the following formulation:

Water	70 gal.
Sodium metaphosphate	8 lbs.
Soda ash	2 lbs.
Calcium carbonate (precipitated or waterground)	400 lbs.
Clay	1600 lbs.
Oxidized starch dispersion (25% solids—320 lb. dry starch	1280 lbs.
Pine oil	1 qt.
Soap solution (10%)	10 gal.

Such formulations may be prepared by combining the pigments, water and dispersing agents in a high-density mixture and kneading them until uniform. These pigment dispersions should have a solids content of about 70 per cent. Starch must be cooked in a separate steam jacketed cooker. After the cooking is finished the hot starch dispersion is mixed with the pigment dispersion in a high-density mixer until a uniform composition results. Thereafter, the auxiliary agents, which in this case include soap and pine oil, are added.

In this formulation, the pigment consists of clay and calcium carbonate (including precipitated chalk and ground limestone), whereas the adhesive consists of oxidized starch. Numerous other pigments may be used, and these include, in addition to clays and calcium carbonates, barytes and talc. All of these are used for white coating colors. Where colored coatings are desired, ultramarine, umber, siennas, ochers and various lakes are used. Synthetic pigments such as titanium dioxide, satin white and blanc fixe may also be used. In certain specialized instances powdered metals such as tin, zinc, aluminum and bronze have been used.

The adhesive in addition to starch may consist of hide glue, casein, or soy bean protein. Synthetic latices such as butadiene-styrene copolymers have been used as have hydroxyethyl cellulose and polyvinyl alcohol.

In addition to these basic constituents, various other materials may be added for specific reasons. Waxes, such as paraffin, carnauba and beeswax may be used to give waterproof coatings. The waxes serve to impart good calendering properties to the sheet as well as smoothness and gloss.

The addition of formaldehyde, urea-formaldehyde resins or melamine-formaldehyde resins provides improved water resistance.

Formaldehyde is of particular interest where casein is used because it denatures the protein making it more resistant to water. This is of great value where the paper is to be used for offset printing. However, when synthetic latices are used in a coating color, the need for waterproofing with formaldehyde is practically eliminated.

With starch similar effects can be achieved by the use of urea-formaldehyde or melamine-formaldehyde resins. Acid catalysts are required, however, and an aging period is necessary before the coating is as resistant to water as is necessary. The addition of butadiene-styrene copolymers also provides a paper which, after an aging period, can be used for offset printing.

Plasticizers for these compositions include materials such as soap, glycerol, invert sugar and corn syrup. These are important because of their hydroscopic properties. Soap is valuable in providing a better appearing coating and in preventing dusting of the coating after calendering.

Pine oil and sulfonated castor oil are defoamers. Lack of foam in a coating color is extremely important if uniform coatings are to be achieved.

Wetting or dispersing agents are necessary in order to achieve proper dispersion of the clay. Sodium hexametaphosphate, tetrasodium pyrophosphate and sodium silicate are commonly used dispersing agents. Dispersing agents, by providing a maximum dispersion of the pigment, tend to make the high-solids composition more fluid.

Traces of various phenolic materials are also added to prevent the bacterial decomposition of the starch or casein.

Coating pigments

Clay is the most common material of the coating pigments. The American industry as a whole uses more clay than any other pigment, and the largest use of clay is in the formulation of coating colors for paper. Clays used in the paper industry are fairly pure kaolins. Those intended for coating have controlled particle size, and the trend is to make the particle size as fine as possible. Coating clays have the best possible color and an attempt is made to control the flow properties of clay so that it will coat properly.

Particle fineness is important since gloss of the coating is a direct function of the size of the clay particle. It has been shown that clay containing a majority of particles with a diameter of 2 microns will yield glossy coatings whereas coarser particles will produce inferior gloss. Viscosity also may be correlated to some extent with particle fineness. Obviously for paper coatings it is desirable to use clay which will give the lowest possible viscosity at the highest possible solids content.

Currently, the trend among large volume machine coaters is toward the procurement of dry clay in hopper type cars, with subsequent make-down and about 70 per cent solids slurry storage. For this purpose, spray-dried coating clays are especially suited, because of their uniformity, excellent dry-flow characteristics (which facilitate handling and unloading), bulk density, dispersibility and general make-down qualities.

Calcium carbonate is a common constituent of coating colors. It is used in the water-ground and precipitated forms, the latter having the more ideal particle size for good coating properties. There are three procedures for precipitating calcium carbonate. One of these is to react sodium carbonate with calcium hydroxide. This by-product lime must be slaked and screened in order to obtain material satisfactory for a coating pigment. The reaction produces caustic soda as well as in-

soluble calcium carbonate. The second method for precipitating calcium carbonate involves the recation of sodium carbonate with calcium chloride. Here the by-product is sodium chloride, and this is readily removed because of its water solubility. This method is widely used. The third procedure for precipitating calcium carbonate involves the reaction of calcium hydoxide with carbon dioxide. Here the only other reaction product is water.

Both the particle size and particle shape of the calcium carbonate are very important. They will affect the flow properties, adhesive requirement and the partcile packing in the coating. While 100 per cent calcium carbonate coatings will have a relatively high adhesive demand, the effect is much less pronounced when these pigments are used in conjunction with clay. The adhesive requirement of the calcium carbonate can be further diminished by high-density mixing or other attrition to give a compacted surface. Naturally, since the adhesive besides being expensive, is an undesirable part of the coating, it should be kept to a minimum value.

Titanium dioxide is frequently used in a coating color to the extent of about 5 per cent. It is valuable, especially in the rutile form, because of its high hiding power and its high refractive index which contributes opacity and brightness to coated paper. Although titanium dioxide has many advantages, its use on paper is limited because of its high cost as compared with clay.

Barium sulfate, in both the barytes and blanc fixe forms, is being used in the production of paper coatings, especially for high-grade photographic papers. Since barium sulfate has a high specific gravity and is practically insoluble in water, it provides a very dense surface.

Satin white is a complex calcium sulfoaluminate produced by reacting alum with calcium hydroxide. It has a high adhesive demand (50-75 per cent on the pigment for starch) and is also high in cost. Thus, its use is limited. It is valuable, however, because its tendency to retain moisture provides a very glossy coating after calendering.

Talc is used in coating colors as a lubricant. Ordinarily, its particle size is quite large, and for this reason it is not, strictly speaking, a coating pigment. Also, it does not tend to produce a glossy surface on calendering.

Coating adhesives

The organic adhesives used in the preparation of coating colors have already been mentioned. Starch, in the form of one of its chemical modifications, is the most widely used adhesive. Starch cannot be used as such, because of its high viscosity and its high molecular weight which makes it too insoluble and detracts from the necessary adhesive value. Also, the dispersions are not sufficiently fluid to obtain high enough solids for adequate coating. Accordingly, starch is converted by one of at least three procedures before use in coating colors. The first of these is known as pyrodextrinization. Here, the starch is heated either with or without catalyst to provide a special type of dextrin. The second type of conversion involves hypochlorite oxidation to yield lower molecular weight materials whose dispersions are more fluid at high concentrations.

The most common way for converting starch, however, is by enzyme conversion. This is the cheapest procedure, but it must ordinarily be done at the time that the starch is to be used. This requires rather specialized equipment. The enzymes are derived from various sources, such as malt, pancreatic preparations of various bacteria and fungi. Starch is suspended in water with 0.3-1.0 per cent enzyme, and the suspension is heated at 160° F until the desired fluidity results. The enzyme is inactivated by heating at 200° F for a short period of time. In some types of operations the starch and clay are mixed together and then subjected to enzyme conversion.

The disadvantage of using starch in coating colors is the lack of water resistance that the starch imparts to the paper. As has been indicated, this can be remedied by the addition of urea-formaldehyde or melamine-formaldehyde resins. One drawback to these additives is that noxious formaldehyde fumes are given off during the drying process. Starch-clay coatings are widely used for the production of low-cost papers of the type used by magazines. Such coating colors are applied by the on-the-machine methods discussed in Part II. Starch solutions, however, of low solids content and low viscosity may also be applied by tub sizing procedures.

Casein is an adhesive which provides a much more water resistant coating, especially when used in combination with formaldehyde. The casein is dispersed in water with the aid of alkali or with compounds such as borax, sodium carbonate or sodium phosphate. Ammonia may be used and actually contributes to water resistance. Sodium hydroxide performs well, but may be harmful to the brushes used in brush coating. Casein is used primarily for the manufacture of coated papers intended for lithographic printing.

Soy bean protein behaves similarly to casein, and the choice between soy bean protein and casein is made largely on the basis of economics.

Hide glue was one of the first adhesives used. Compared with starch, however, it is rather expensive and has very poor waterproofing properties. It is still used in the manufacture of special paper such as playing card paped, wall papers, and in metal coated papers.

Perhaps the most interesting advances made in the past few years have involved synthetic adhesives. These include carboxymethyl cellulose, methyl cellulose, polyvinyl alcohol, and hydroxyethyl cellulose. For the most part, the cost of these materials makes it imposible to use them except for special applications. Considerably cheaper are butadiene-styrene copolymer latices. These may be substituted for as much as 50 per cent of the casein or starch normally used. The latex has adhesive power equivalent to the natural materials, and since the coating flows during calendering, a smooth glossy surface results. The latex also plasticizes the casein or the starch to make the paper more flexible and free from curl. Papers containing butadiene-styrene copolymer latex are sufficiently water resistant after aging to be used in offset and gloss ink printing.

Hydroxyethyl cellulose has been used in a new process which is based upon the observation that it is soluble in a critical concentration of caustic soda. It is not, however, soluble in virtually any other solvent. Accordingly, the coating color is made with a caustic solution of the hydroxyethyl cellulose. As little as 7 per cent of the hydroxyethyl cellulose is effective.

According to a report received on the new process, the coating color is applied to the paper in the normal fashion, after which the paper is brought into contact with a solution of ammonium sulfate. The ammonium ions replace the sodium ions and the hydroxyethyl cellulose immediately precipitates in the form of a non-tacky solid film. The clay is occluded in a smooth precipitated film, and the excess ammonium sulfate and sodium sulfate, produced during the chemical reaction, is removed by passing the sheet through squeeze rolls. The coated sheet is then dried in a normal manner to obtain a coating which is so smooth that it does not have to be calendered. Therefore, it has higher brightness and more opacity and is more compressible and flexible than a super-calendered sheet. This makes it of value where printing is to be carried out with sticky or tacky inks.

Problems in adaptation of electrical engineering to the paper industry*

M. W. MATHEWS

International Paper Co.
Mobile, Ala.

The electrical engineer's role in a paper mill requires proficiency in power generation, power distribution, motor application and controls, dc systems, communication and electronics

THE MAIN PRODUCTION flow of a pulp and paper mill is a straight line as represented by the heavy column (center) in Fig. 1—from the woodyard to the finished paper.

The kraft process has a chemical cycle tying into it that has the important advantage of permitting recovery and reuse of a high percentage of the chemicals. Approximately 60 per cent of the sulfur, 90 per cent of the salt cake and 95 per cent of the lime used in each cycle can be recovered.

The bark stripped from the wood is burned in boilers to dispose of the bark and to generate steam. The liquor and other wood residues in the "black liquor" are burned in the recovery furnaces to recover the chemicals and to generate steam for the mill. The bark boilers furnish 10 per cent of the steam, the recovery boilers furnish 40 per cent, and the remaining 50 per cent is generated in power boilers. The steam pressure and temperature in the boilers is generated at pressures above process pressures, and turbogenerators are used to generate electrical energy and act as pressure reducing stations.

Electrical engineering fields

The electrical engineers' role in supplying electrical energy to drive the various departments requires a proficiency in many electrical engineering fields, namely: power generation (the application of switchgear and relays), distribution,

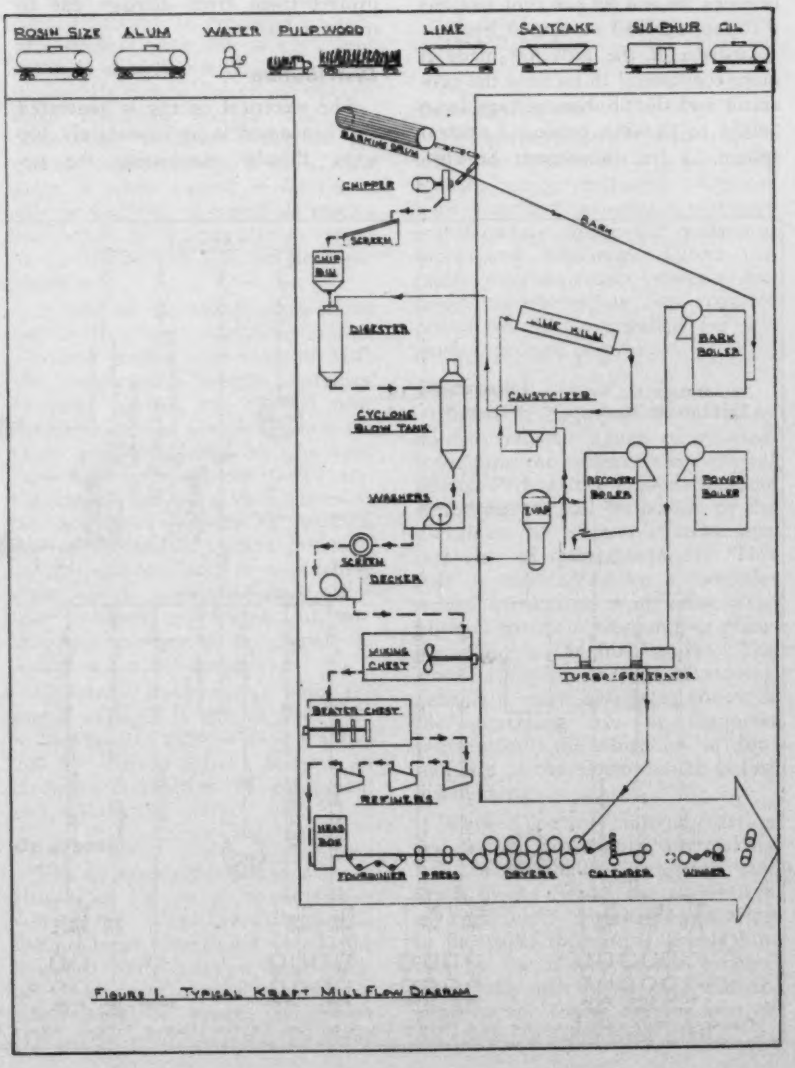

FIGURE 1. TYPICAL KRAFT MILL FLOW DIAGRAM

*From a paper presented at the AIEE Pulp and Paper Conference, Gainesville, Fla., March 8-9.

substations, application of motors and controls, dc systems, communication, electronics, and lighting.

Wherever possible, such as in new mills, electrical system planning should be undertaken for the system as a whole, and each element must be adapted to fit its particular function in the system of which it is a part. The system planning should start from the load and be carried back through the distribution and transmission system to the generation system.

Power generation

Fig. 2 is a one-line diagram of a power distribution system for a typical kraft mill of 1600 tons per day. This is a typical mill with its own generating plant producing 90 per cent of its consumed electrical energy. The plant capacity is 43,100 kva, operating with a power factor between 98 and 99 per cent and has a connected load of 60,330 hp.

Growth of the mill has made it more economical to increase the generator and distribution voltage from 2400-v to 13,800-v grounded neutral system. A tie transformer between the 13,800-v and 2400-v systems was added to utilize the existing equipment and operated as one system with the generators in synchronism.

Relay equipment was omitted from the old line diagram. The function of the relays is to protect the entire electrical system and components from abnormal and harmful conditions, such as short circuits and lightning surges. Relays operate equipment automatically to clear the fault and isolate the endangered part of the system. Power fuses, circuit breakers, lightning arrestors, and surge absorbers are examples of protective equipment. Fuses and circuit breakers are selected for application according to the rated voltage, rated current and rated interrupted capacity. Differential protection is used on generators, transformers and electrical buses to protect them from damage due to internal faults.

Distribution

The electrical energy is generated and consumed in approximately 300 acres, thereby eliminating the necessity of high transmission voltages over long transmission lines. Paper industry is a process system requiring a large amount of pipe. For this reason the electrical distribution system generally is an underground system allowing maximum piping areas. Each distribution feeder cable is sized on the basis of rated load current, short circuit current, and voltage drop.

Substations

Unit substations, similar to transformers "B" in Fig. 2, are located throughout the mill in the center of load areas to minimize low-voltage feeder runs. Also, the area affected by a fault or failure is a small portion of the mill and will have less effect on lost production time. A departmental electric center may have one, two or possibly three unit substations, each consisting of a 1500-kva, three-phase transformer with secondary group breakers. The transformer and secondary group breakers are located in a separate room adjacent to the starter room. This makes for compactness and meets the National Electrical and Fire

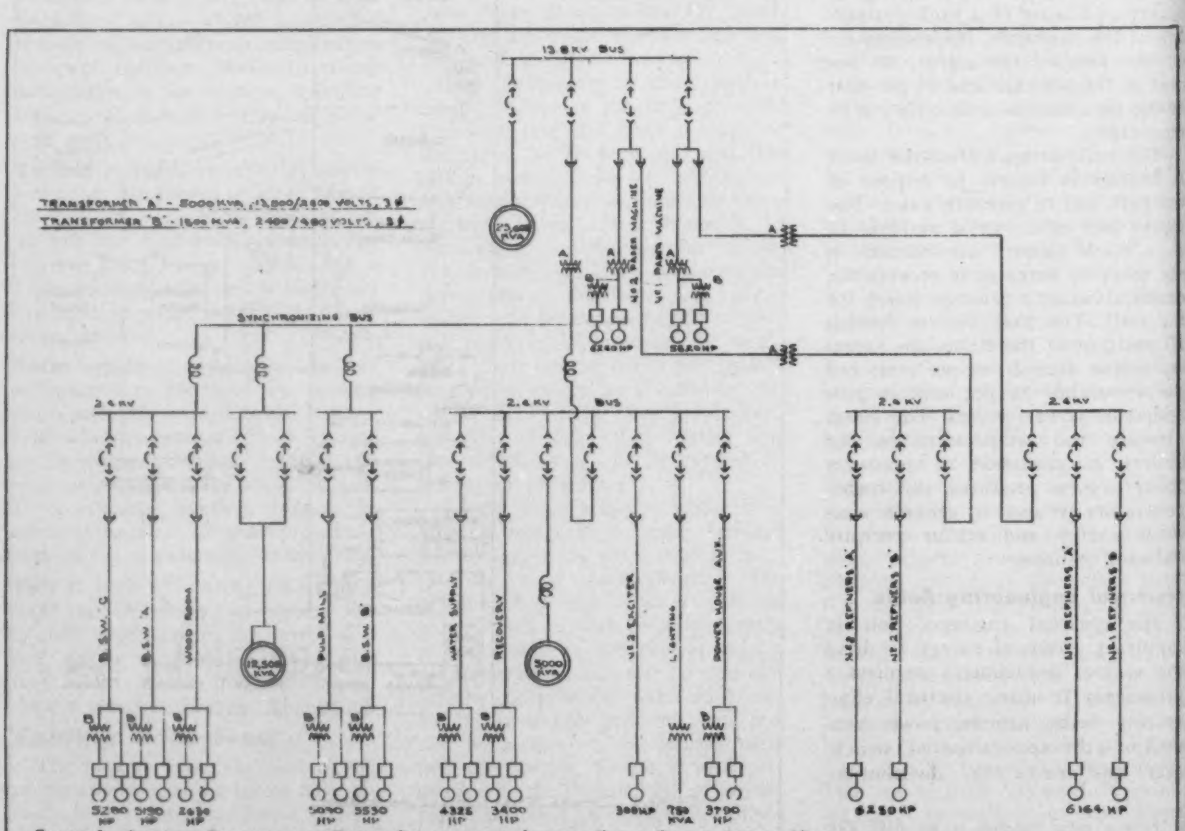

FIGURE 2. ONE LINE DIAGRAM OF A POWER DISTRIBUTION SYSTEM FOR A TYPICAL KRAFT MILL

Codes. The complete electric center building is designed and constructed with the National Electrical and Fire Code requirements as minimum standards.

The heat dissipated by the transformers, motor-generator sets and starters must be removed from the center since the starters are thermal devices. The closer the ambient temperature can be maintained the better the heater strips for motor overload protection can be engineered. Normally, ventilation other than natural is required. Starter contacts will have a longer trouble-free life if dust is kept to a minimum in the center. Self-cleaning oil bath air filters in the air supply are used to remove the dust from the ventilating air.

Application of motors and controls

Generally, a combination magnetic contactor with air circuit breaker is installed in shop assembled power panel for each motor. They provide safety for operators, protect line parts and achieve compactness. Air circuit breakers are used in place of fuses to eliminate single-phasing a motor. The unit substations have sufficient capacity to permit use of across-the-line magnetic starters for most motors. Under-voltage protection and overload protection are incorporated in all starters. Pushbuttons are located at convenient locations for the operator and at various key control points.

A motor application may be considered as the matching of motor characteristics to machine characteristics with suitable control equipment. Consequently, with a certain machine in mind there are a large number of points to check before the proper motor and control can be specified. Some of the more important machine factors are listed in the next paragraph, but the engineer must find out in each case how the machine operates, how it will be controlled and in general become familiar with all electrical, mechanical and production requirements.

The following are important machine and local characteristics that should be known and studied:

1. Speed of driven shaft.

2. If adjustable, what range in speed is required?

3. Horsepower required at maximum speed or loading.

4. If load is not constant, like that of a hoist or elevator, describe the cycle duty, giving the variable items, such as load, time, speed, weights, and other factors.

5. If the speed varies, how does the torque vary with the speed?

6. Torque-starting, pull-in, pull-out or maximum, all in per cent of full-load values.

7. Mechanical connection—belt, chain, coupling, gear or gearmotor.

The two important mechanical characteristics which must be considered in connection with the installation of a motor are the type of mounting and the type of enclosure and ventilation.

The types of motor mounting to consider are horizontal, vertical, flange mounting, gearmotor and other arrangements.

The types of enclosure and ventilation to consider are open, drip-proof, splash-proof, totally enclosed non-ventilated, totally enclosed fan-cooled and explosion-proof.

The motor type is determined by the characteristic requirements of the machine. All drives requiring constant speed should use squirrel-cage induction or synchronous motors because they are rugged and lower in cost. Drives requiring varying speeds may be driven by wound-rotor induction motors. For machine tools or other machines requiring adjustable speed or a wide range of speed control, it will probably be desirable to install dc motors and supply them from the ac system by motor-generator sets, or electronic rectifiers.

A few of the many applications for squirrel-cage induction motors are fans, pumps, generators of M-G sets, compressors, mixers, agitators, chippers, beaters, etc. Wound-rotor induction motors are used mostly for crane and hoist duty. Synchronous motors are for power factor improvement and serve such drives as air and gas compressors, vacuum pumps, centrifugal pumps, grinders, refiners and M-G sets, in cases where exact output speeds are imperative. The common application for synchronous motors in the paper industry is for refiner drives.

Generally, the breaking point for motor voltages is 440 or 550 v up to 200 hp and 2300 or 4160 v above 200 hp. This is arrived at from an economic evaluation of equipment and installation costs.

Dc systems

The dc adjustable-voltage drive is also often known as the variable-voltage or Ward-Leonard system. For machines requiring a wide range in speed control and a large number of steps of control, the adjustable-voltage dc system is most extensively used. Adjustable-voltage drives are used on washer drives, cranes, hoist winders and section motors or helper drives of paper machine drives.

Lighting

Generally, for lighting applications a dry type 15-kva transformer with a 20-circuit panel is centrally located to avoid long branch circuits. The localized transformer for lighting also minimizes the area affected in event of failure.

Illumination is designed for intensities between 15 and 20 foot-candles, and intensities for areas of higher seeing task are increased with local lighting.

Many types of lighting systems are designed to meet the specific needs of the mill such as:

Flood lighting ..... wood storage and outside storage areas.
High bay ..... machine room, warehouse, power plant and digester building.
General ..... operating areas of the mill.
Industrial ..... maintenance shops.
Office lighting ..... mill offices and control rooms.

Communication

The communication system of a mill may consist of a public telephone branch exchange, together with a private automatic exchange and a coding system for contacting supervisory personnel. Direct isolated communication systems between operators at key control points are being installed for improved process control.

Electronics

Electronic equipment is being used to transmit signals of information along the system to key control points. Perhaps the greatest obstacle in the way of full realization of the usefulness of electronic techniques is a fear of their complexity. This fear is misplaced, for a well-designed instrument is no more complicated than a corresponding pneumatic or mechanical system. The almost complete absence of moving parts is a great advantage, and with the increasing use of magnetic transductors, the objection of limited life of the electron tube is fast disappearing.

While control instrumentation for certain phases of papermaking will undoubtedly progress very much in the future, the application of completely automatic operation to the paper machine is greatly limited by the nature of the process. Therefore, such an advance will depend on the future development of papermaking equipment itself.

Safety needs promotion

J. E. BEDFORD

Industry identification in posters, frequent change of posters, personal letters of congratulation, contests and awards that do not drag on for months are successful methods of safety promotion

THE SAFETY RECORD of any paper mill usually reveals that the accident rate goes down during a safety training program. It is held down immediately following this type of program. Then, suddenly accidents will start to happen all over the plant. The paper mill's accident rate will then be as high or higher than it was before the safety program was put into effect.

Why?

Usually it is because the newness of the safety program has worn off around the mill. Workers and supervisors have fallen back into their old habits. . . .they neglect to keep practicing the safety rules covered in the initial safety training program.

When the accident rate starts to climb, paper mill management is apt to consider the safety program a waste of time and money and cast it aside. This may pare a few dollars from the evident overhead expense, but the hidden cost of accidents will remain — lost time, lower production, equipment repairs, and lower employee morale.

Progressive paper mill management does not stop the sales promotion and advertising program when business starts to decline. They put more effort into promotion. This may include more aggressive selling, sales contests, more extensive advertising, or offering extra commission to the salesmen.

Safety programs need a "shot in the arm" to keep them at top efficiency and to keep the accident rate at a low level. Here are some ideas other paper mills have found helpful in promoting their safety programs:

Bulletins to show industry identification

Safety posters can be purchased in quantity for use on your bulletin boards. However, this type of poster usually falls into a standard pattern. A check with the employees in the plant the day after the poster has been changed will not reveal much identification or interest. Workers form a habit of tuning out the standard safety poster just as they have learned to tune out radio and TV commercials.

Part of the reason for this lack of interest in the prepared safety posters is that they lack plant human interest. The people pictured on the poster are not known to the people in your paper mill. The scenes illustrated may be for an accident in a steel mill or a canning factory and lack paper industry identification necessary for arousing the interest of your employees.

However, when this poster idea is changed to a poster of an accident in your paper mill, or a photograph of one of your men who has an enviable safety record, the workers in your paper mill will read and remember the safety poster. This will have human interest for your employees.

Paper mills that have adopted this idea of posters make these recommendations:

1. Change the posters frequently— at least every two weeks.
2. Picture current accidents — not ancient history in the mill.
3. Have the poster tell the story — who, what, why and how the accident could have been avoided.
4. Keep copy on safety posters at a minimum — people do not have or take time to read a long message.

Personal letters of congratulation

Every time the safety records of an employee are reviewed, it is suggested that the safe worker receive some kind of a personal letter from a top executive in the paper mill. This can be a short note of congratulations to each employee who has gone through the period — six months or a year — without an accident.

These letters can follow a form yet be made personal by a review of each individual's long standing safety record. If the employee received a safety letter a year ago, for instance, the second letter might start something like this:

> "Last year when I wrote you about your fine safety record, I sincerely prayed that I would be able to send you another letter this year. You have gone two years without an accident! Congratulations, John."

Paper mills with a limited number of regular employees have found that this form of stimulation is best when the letter is delivered to the home of the safety-minded worker. It helps the family realize how important safety is considered by the boss.

Larger paper mills have a more frequent system of writing to new employees. Statistics prove that new workers are more accident prone than older workers. Thus, new employees receive a letter when they start, after a month, three months, six months, nine months, and one year. After this time the new worker is placed on the regular roles of safe workers.

Another plan for these letters is to send them to all the employees in one department. Thus, the entire department is congratulated for its safety record. This starts a form of rivalry between the different departments to establish a top safety record.

Paper mills using personal letters recommend the following rules:

1. Don't use the mimeographed form letter — make it personal or don't send it.
2. Tie-in with past safety letters to make the congratulations more personal and more sincere.
3. Work out a system so that none of the employees are overlooked in this safety letter program.

Contests and safety award drawings

Safety contests have been used in many paper mills with a wide variety of results. If the contest is successful in keeping the accident rate at zero for any period of time, the contest drags on for months. Employess tend

(Continued on page 396)

New results and ideas in paper coatings*

Coating adhesive demand — What pigment function governs it?

(Miss R. M. Karapetoff Cobb, Lowe Paper Co.)

▶ Applying the water absorption test on 15 white pigments (i.e., alumina, calcium carbonates, English clays, calcium silicate, titanium dioxide, barium sulfates, domestic clays, calcined clays, and silica) yielded a new numerical specification not hitherto furnished by the manufacturer of coating pigments. In a radical departure from the weight relationships which have been the backbone of adhesive calculations in coating formulations, the results of the experiment were expressed in volume relationships (i.e., cc casein per 100 cc pigment), thus taking differences in specific gravity into account. On this volume basis, the property which seemed to govern the adhesive requirement of pigments was the per cent voids as tested by water.

▶ When results were considered on a volume basis, the point at which pigment was bound tightly enough to the paperboard to lift fiber instead of coating corresponded to filling about 21 to 24 per cent of the voids with casein adhesive. Calculation of the water layer over the surface of the pigment indicated it to be 100 molecules, or 0.033 microns deep. The casein layer calculated to be 10 - 18 molecules, or 0.006-0.01 micron deep, should be resolvable in the electron microscope.

▶ While it is believed that under general mill conditions coating formulations will continue to be figured on a gravimetric dimensionless basis, it is stressed that in all contemplation of pigment-adhesive relationships we must begin to think in terms of a definite structure, with dimensions; and consequently our formulations must be made on a volume basis. Except for the heavier pigments, the per cent adhesive by volume was found to average about 1.8 times the per cent adhesive by weight.

New starch products in coating adhesives

(Robert W. Bond and Daniel E. Lucas, Corn Products Refining Co.)

▶ A patented mechanical process produces more uniformly converted dextrine products than has been possible in conventional equipment. These dextrines are now being evaluated by several large paper concerns.

▶ Development of a new source of waxy starch promises an increased availability to the paper industry of this basic raw material.

▶ In dealing with problems of in-plant enzyme conversion of unmodified starch, emphasis should be focused on the calcium content of the converting system rather than on water analysis and pH control.

A new product for the insolubilization of starch films

(J. R. Belcho Jr. and G. K. Cleek, Allied Chemical & Dye Corp.)

▶ Water resistant films can be formed by simply adding UF Concentrate (59 per cent formaldehyde, 26 per cent urea, and 15 per cent water) to oxidized, dextrinized or enzyme-modified starch dispersions. The films formed from these dispersions have been found to be more water resistant than the films formed from dispersions to which dimethylolurea had been added. UF Concentrate may be added to acidic, neutral, or alkaline starch dispersions. Only 10-15 per cent UF Concentrate based on the weight of the starch is required for the formation of highly water resistant films.

Use of triazone resin for producing water resistant starch-clay coatings

(R. J. O'Brien, E. I. du Pont de Nemours & Co.)

▶ The coating of paper with a starch-clay coating, insolubilized by the addition of a triazone resin and catalyzed with acid, has given excellent results under laboratory conditions. The coatings became completely insoluble after being dried at 220°F. for 1 min. The preparation of the coating color at low solids contents (25-40 per cent) is very simple. The triazone resin may be added as the last ingredient of the coating color formulation or it may be cooked with the starch adhesive with equal results. In the case of higher solids coating mixes, the clay slurry at 65 per cent solids must be pretreated with a dilute solution of sodium chloride before the addition of triazone resin, otherwise the slurry will turn into a solid mass.

Mechanism and kinetics of emulsion polymerization

(J. W. Vanderhoff and E. B. Bradford, Dow Chemical Co.)

▶ A new technique for investigating the mechanism and kinetics of emulsion polymerization has been developed. Monomer is polymerized in a seed latex, which is a mixture of two different size uniform particle size latexes. The competitive growth rates of different size particles, as determined by electron microscope before and after polymerization, can be determined. In general, the smaller particles grow at a faster rate diameterwise than the larger ones, resulting in the over-all particle size distribution becoming narrower. The effects on competitive growth rates of such experimental variables as latex particle size, initiator concentration, temperature, latex particle proportions, emulsifier concentration, and type of initiator (water-soluble, oil-soluble, and gama-rays) have been determined.

Effect of Dow latex 512-R on the rheological properties of casein, alpha protein, and starch bound clay coatings

(R. G. Jahn, Dow Chemical Co.)

▶ Dow latex 512-R proved to be a suitable modifier from a rheological standpoint for the coatings utilizing casein, alpha protein, and starch binders. By substituting Dow latex 512-R for 25 per cent of the binder in casein or alpha protein bound coating colors, an increase in solids of between 3 and 7 per cent could be utilized before the viscosities of the latex modified coating colors exceeded those of the unmodified controls. When Dow latex

*As disclosed at the Seventh Tappi Coatings Conference

512-R was used as a 50 per cent replacement for either casein or alpha protein, an increase in solids of between 5 and 12 per cent was possible before the viscosities of the latex modified coating formulation exceeded those of the control.

▶ By substituting the latex for part of the starch in a starch bound color, with or without soap modifier, the reduction in viscosity was not as great — giving only a slight reduction with a 25 per cent replacement but a significant reduction with a 50 per cent replacement.

Use of starch derivatives in paper coating

(W. C. Black, Penick & Ford Ltd. Inc.)

▶ Many of the objectionable features of conventional corn starch pastes such as set-back and gelling, retrogradation, excessive shrinkage on drying, poor filming properties and poor water holding ability are largely due to molecular reassociation in the cooked paste. This reassociation is largely minimized by derivatization of the base starch, the viscosity of which is also adjusted by one of the conventional depolymerization processes.

Acrylic emulsions in greaseproof coatings

(A. D. Jordan Jr., Rohm & Haas Co.)

▶ A coating consisting of an acrylate emulsion polymer and a low molecular weight water soluble polymer presents practically no cure or drying requirements. The mixture air dries to form coatings with extreme block resistance and gloss equivalent to those of solvent coatings.

On-machine greaseproof coatings with polyvinyl acetate emulsion

(C. P. Argana, E. I. Dupont de Nemours & Co.)

▶ Grease-resistant coatings based on "Elvacet", polyvinyl acetate emulsion, have been developed for on-machine application. The concept of on-machine application of compositions containing polyvinyl acetate emulsion is new and unique, since trials in the past invariably resulted in blocking or sticking of the polyvinyl acetate resin to the dryer rolls. This blocking and sticking has been eliminated by incorporating pigments into the coating composition.

▶ The addition of a small amount of "Elvanol", polyvinyl alcohol, to the coating composition results in maximum grease resistance at various pigment-to-binder ratios. For example, when polyvinyl acetate emulsion is used as the sole binder, grease resistance at a 2-1 pigment to binder ratio is only fair. When approximately 5 per cent of the polyvinyl acetate resin binder is replaced with polyvinyl alcohol, grease resistance at the 2-1 pigment to binder ratio is excellent.

Viscosity control of paper coating adhesives with urea

(J. R. Belche Jr. and O. C. Ellis, Allied Chemical & Dye Corp.)

▶ Urea lowers the initial viscosity of modified starches, casein, and alpha protein and decreases the rate of viscosity increase with age. It has no effect on unmodified straches other than to lower gelation temperature.

These results should enable the paper coater to evaluate the usefulness of urea as a material which will permit the use of higher solids contents in paper coatings where viscosity is a limiting factor.

Latex emulsion paint technology applied to paper coatings

(J. P. Talley, J. P. Davis, and R. E. Benton, The Goodyear Tire & Rubber Co.)

▶ A wealth of information on formulating techniques, materials and equipment is available from the latex paint industry. Much of this information can profitably be adapted by the paper coater.

Latex variables and properties of coatings and coated paper

(D. A. Taber, The Dow Chemical Co.)

▶ Satisfactory latices for paper coating can be obtained through a program of preparation and evaluation, the latter involving actual tests of the foam and stability of coating colors, as well as various measurements of the coated paper — such as adhesive strength, varnish hold-out, wet-rub resistance and gloss. All details of latex preparation, such as styrene-butadiene ratio, polymerization temperature, per cent catalyst, per cent chain regulator, type and amount of emulsion stabilizer, and per cent cross-linking, must be considered.

▶ Each of these factors has a bearing on the performance of the coated paper, and — ideally — their interactions upon one another must also be evaluated. For example, it is shown that increasing the styrene content above 60 per cent gives higher gloss, but this must be evaluated against a loss in adhesive strength and wet-rub resistance.

Safety Needs Promotion

(Continued from page 394)

to lose interest after a month and the value of the safety contest is lost.

However, if the accident rate is particularly high in a paper mill, the contest can be used for a short time to provide a stimulant to get things on a more even keel. Then, after the contest has run for 30 days, the awards can be made. This will eliminate the long drawn out waiting and the lack of interest that may develop.

Another form of contest that paper mills have found successful is to have a weekly safety drawing. Management puts up a weekly safety award, — $5, $10, $25, or whatever is in line with the number of employees in the mill and the seriousness of the accident rate. Each week the workers who have had sixty accident-free working days are entered in the drawing.

After a worker has had an accident, he must maintain a sixty-day safety record before he can participate in the weekly drawing. This keeps everyone safety conscious and ties in with the payroll pools that have developed in many plants.

A variation of this weekly drawing is to eliminate all workers in a department when there is an accident in the department. Thus, all employees in the department suffer if one employee has an accident. Safety is a topic of conversation, observation and activity all the time.

Best results are obtained when the contests and the drawings follow these suggestions:

1. Keep the time limit of the contest under 30 days and drawings on a weekly basis.
2. Make the rewards worthwhile to build greater worker enthusiasm.
3. Post contest results or names of the drawing winners as soon as possible.
4. Emphasize safety in all activities connected with the contest or drawing.

These three methods of promoting safety are by no means the complete list . . . they represent ideas that other paper mills have found helpful. Variations of these ideas and other methods of promoting safety are all around any paper mill.

Management that has a keen desire to maintain a low accident rate will find plenty of ways to remind the workers and supervisors that **safety is everyone's problem — every day!**

CURRENT COMMENTS

Supply and demand studied . . . more mergers . . . and political fences

What are the facts as to paper consumption and industry plans to keep up with the steadily increasing demand? A three-pronged study of this problem is underway which will go far to determine whether there is over-optimism as to the future of the industry, or whether complaints of short supplies are to be met.

Industry economists and facilities will be combined to round out a study being made by government agencies. On the side of industry, the American Paper & Pulp Association and the National Paperboard Association have joined hands to get the facts. On the side of government, the Forest Products Div. of the Business & Defense Services Administration is studying supply and capacity of paper and paperboard for the subcommittee on commerce and finance of the House Committee on Interstate and Foreign Commerce. The data compiled by the two associations will be made available to the government agency as an authentic check by the industry itself on its own future.

Government assistance

Complaints by newspaper publishers of newsprint shortage and by magazine publishers of a questionable future supply of book paper have led to demands for government assistance for the construction of new mills, particularly in the newsprint field.

On the other hand, trade papers and the daily press are filled with announcements of allocation of hundreds of millions of dollars for the construction of new mills. Much of this enormous sum is already committed by producing companies. Many more hundreds of millions are reportedly allocated for additional construction, but a large part of this is not definitely finalized.

One question, not a minor one, is whether the paper and pulp machine builders have the capacity to erect the machines which are reported as planned for the immediate future.

The present plans for the joint capacity survey envision detailed information as to additional new capacity actually contracted for in 1956, 1957, 1958 and through 1959, as compared with actual capacity as of the end of 1955. The study will include plans for the remodeling of existing machines. The report will probably also list contemplated expansions, as segregated from finalized commitments already "in the works."

A prolonged strike in the steel industry may have a deterrent, or at least a delaying, effect on the rate of paper mill expansion.

Much of the future planning by the industry is based on economic studies of the probable consumption of paper in the next decade. To what extent these forecasts will dovetail with future industry financing is another story and a story for the men with the purse strings to determine.

Mergers in the news

In this era of paper industry mergers by far the most important recent development is the sale of Robert Gair Co. to Continental Can Co. A sale proposal is being submitted to the stockholders of both companies. Based on 1955 sales, the combined sales of the two firms run to well over three quarters of a billion dollars.

Under the sales proposal now pending, Robert Gair common stockholders would receive eight-tenths of a share of Continental for each share of Gair. A little complication is involved in the case of the holders of preferred. A new convertible issue of preferred would be issued by Continental to be exchanged on a share-for-share basis for Gair preferred, and the new preferred would be convertible into Continental common at the rate of 2.4 shares of common for each share of preferred. This detail is of interest because of the fact that the consolidation involves a combined corporation of $500,000,000 value. Gair stockholders will get $144,000,000 in Continental stock at current values. The move is of general industry importance because through the acquisition of Gair, Continental will practically cover the packaging market from tin cans to shipping containers.

Another significant merger means the practical disappearance of United Wallpaper Inc. from the industrial field as a separate entity. Its operations will be taken over by and merged with the wallpaper section of Sears, Roebuck & Co. Sears will take over practically all United stock and will name Sears officials as heads of United, which will retain its name, but with the present Sears plants will be a combined producing subsidiary for the mail order house.

Into the discard?

With members of Congress anxious to get home for political fence building, legislation affecting the paper industry will either go into the discard or be so hurriedly passed that the results of legislative action may be anywhere in the range from useless words to restrictive controls on industry operations. With administration efforts being centered on world economics, the last-minute legislative rush cannot be forecasted.

Financial Reports

Paper mill securities continued their upward trend during late June and early July, along with other industrial issues. Paper mill profits and sales continue to make the field attractive to investors.

Paper mill corporate changes

Ascot Chemical & Adhesive Corp. is a new company established by Eastern Corp. of Bangor, Me., and E. S. and A. Robinson Ltd. of Bristol, England, to make and sell a line of tranparent tapes now produced for the world market by a subsidiary of the British corporation.

British Columbia Forest Products Inc. has sold a block of 1,000,000 shares to Scott Paper Co. for $15 per share, giving Scott nearly 30 per cent of the company's stock. Some of the funds are to be used for expansion of bleached kraft production on Vancouver Island.

Carton Craftsmen Inc. has become Carton Craftsmen Corp. as a subsidiary of Cornell Paperboard Products Co.

Fort Miller Pulp & Paper Co. of Fort

*Current Comments are contributed, and the opinions expressed do not necessarily reflect the views of the publisher.

Current comments . . .

Miller, N. Y., idle for over a year, will be put into operation as a pulp mill with its purchase by Cottrell Paper Co. of Rock City Falls, N. Y.

Growers Container Corp. of Salinas, Calif. has sold a block of authorized but unissued stock to St. Regis Paper Co. amounting to 40 per cent of the company. The proceeds of the sale will be used in expansion of Growers.

J. & J. Rogers Co. of Au Sable Forks, N. Y., the oldest sulfite pulp mill in the United States, has been sold to Standard Ore & Alloys Co., but will continue in operation under the historic old name after some extensive modernization and expansion.

Keyes Fibre Co. has offered stockholders rights to purchase 100,000 shares of new first preferred stock, 4.8 series, at the rate of one share for each seven shares of common now held, the price being $25.25 per share.

Massilon Paper Co., a 90-year-old paper board company of Massilon, Ohio, has been sold to a group of Canton businessmen headed by Ben Marks as president.

Minnesota & Ontario Paper Co. directors have recommended that stockholders approve a two-for-one split of the common.

Minnesota Mining & Mfg. Co. has acquired a substantial majority of the stock of Hartford City Paper Co. of Hartford City, Ind. The product of Hartford City, a pioneer in greaseproof and similar protective paper wrappings, will readily integrate into the 3-M output of various adhesive tapes and insulating materials.

The Paper Corp. of America mill at Cheboygan, Mich., was sold for $600,000 recently through a New York federal court at a receiver's sale to Charmin Paper Mills Inc. of Green Bay, Wis. After being closed since June 1953, when 200 employees lost their positions, it will take six months to put the plant back in operational shape.

Raymond Bag Co. of Middletown, Ohio, has been acquired by Albemarle Paper Mfg. Co. of Richmond, Va., permitting Albemarle to integrate its operations from the forest to the finished product for consumers.

Sweet Paper Corp. of Phoenix, N. Y., will become a wholly-owned subsidiary of the Burrows Paper Corp. of Little Falls, N. Y.

United States Gypsum Co. stockholders have approved a five-for-one split of the company's common stock, currently quoted at approximately $290.

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Stock and Bond Quotations

New York Stock Exchange — Stocks

Closing Prices	July 10, 1956	June 11, 1956
A.P.W.	4¾	*5⅞-5¼
Celotex	44⅞	41⅞
Same Pref.	19¾	*19⅜-19¾
Certain-Teed Products	32	29½
Champion P & F	87¾	79¼
Same Pref.	104½	*104⅜-107⅛
Cheasapeake Corp.	42	39
Container Corp.	91⅜	80
Same Pref.	*101-103	*99-101
Crown Zellerbach	64½	63
Same Pref.	*102¾-103½	103
Dixie Cup	53⅞	55½
Eastern Corp.	32⅛	32¼
Federal Paper Board	32⅞	33
Fibre Paperboard	39	40
Same Pref.	*120-128	123¾
Robert Gair	35⅝	29¼
Same Pref.	117	110
Great Northern	102¼	100
Hammermill	35⅝	35
International	141½	132¼
Same Pref.	100½-101	102½
Kimberly-Clark	52⅞	50⅜
McAndrews & Forbes	*43-44	43½
Marathon	40¼	38⅜
Masonite	43¾	44½
Mead Corp.	37	35½
Same Pref.	*101¼-102½	*101-102½
Same Second Pref.	81	*78-91
Minnesota & Ontario	37⅜	35¼
National Container	35⅞	32⅜
Same Pref.	63	56½
Oxford Paper	45¾	45½
Same Pref.	101½	100
Rayonier Inc.	38½	34⅞
Riegel	36⅝	36¼
Scott Paper	73⅛	67⅜
Same $3.40 Pref.	*94-95½	*95-97
Same $4.00 Pref.	*100-101½	*100-102
St. Regis Paper	54½	50¼
Same Pref.	*100⅛-102½	*102¼-103
Sutherland	46⅜	43½
Union Bag & Paper	39½	39⅜
United Board & C.	23½	23
United Wallpaper	1¾	2⅛
Same Pref.	23½	*25-27
U. S. Gypsum	68	64¾
Same Pref.	*176½-178	*174½-177
West V. P. & P.	59½	58
Same Pref.	107	105⅜-106

New York Stock Exchange — Bonds

A.P.W. 5%	82	80½
Champion P. & F. Co. 3¼%	—	99
Mead Corp. 3%	—	101

American Stock Exchange — Stocks

American Writing	22	*21½-23½
Brown Company	20⅜	20½
Puget Sound	60	59

*Closing Bid and Asked Prices.

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Why? First, because this chain is specially designed for abrasive, sliding, heavy-load use. It is a steel fabricated chain, made from toughest steel, using the latest fabricating methods and hardening processes to insure *extra* quality, strength and stamina.

Next, this chain is precision made to last longer and give smooth, efficient sprocket action. Lastly, this chain saves valuable production time with a simple 3-Diameter Pin that makes assembly and disassembly fast and easy.

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Rex Chabelco Steel Conveyor Chain. Average ultimate strengths range from 25,000 to 100,000 pounds.

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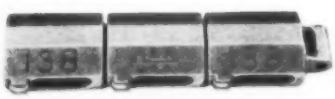
Rex H-Type Mill Chain — Most popular of all sawmill size chains for conveyor use. A tough, versatile chain with special wearing shoes for sliding.

Rex H-Type Mill Conveyor Chains—Used for conveying slabs, chips, sawdust and refuse. Heavy, one-piece links with thick barrel provide long wear and good scraping action.

Rex Durobar and Combination Chains — A proven standard for wood handling service. Eccentric barrel of Durobar chain reduces wear on both chain and sprockets.

Rex Roller Drive Chain—The ultimate in high-speed drive chain. Highly flexible to withstand heavy shock loads. Precision-made for longest life. Available in single or multiple strands for a variety of drive uses.



Rex Roof-Top Transfer Chains — Primarily a green chain, but frequently found in sawmill transfer service. Choice of peaked or flat roof-top design. Flat roof generally used for handling finished lumber as it will not score.

Rex Chabelco Chains — For severe conveyor service, Rex Chabelco Chains are first choice. Available in both straight and offset side bar construction. Also special Chabelco Chains designed for log deck, log haul-up, trimmer, etc. service.

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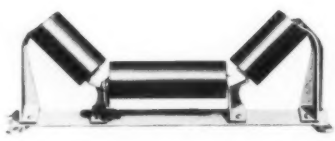

Rex Style No. 46 Troughing Idler — Specially designed for handling wood chips. Concentrating rolls of the idler are sloped at 45° to provide exceptional carrying capacity. This feature permits loading of chips close to the belt edge without spillage and gives the belt additional carrying capacity when compared to the conventional 20° sloped idlers.

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NEWS of the INDUSTRY

ADDITIONAL CAPACITY and increased cleanliness will result from screen room modernization, shown here underway at the Fort Frances, Ont. mill of Minnesota & Ontario Paper Co. At the upper right is the new test station. Fourteen new decker units have been installed

Mando Modernizes Screen Room Equipment at Fort Frances Mill

A long-term modernization program is nearing completion at the Fort Frances, Ont. mill of Minnesota & Ontario Paper Co. Started a little more than a year ago, the project aimed at bringing much of the equipment up to date, while at the same time providing capacity to handle the production resulting from the modernization of No. 7 paper machine.

The principal work was the installation of 12 groundwood and two sulfite Hymac-Cowan deckers to replace 19 units, which consisted of 14 Pscol deckers, three Oliver filters and two wet machines that had been converted into deckers. Operation of the screen room was not interrupted during the modernization.

The new deckers are equipped with stainless steel supply headers, discharge chutes and outlets. In addition, each is equipped with an individual drive. To complete the screen room modernization, the roof will be raised and replaced, and air conditioning is to be installed.

According to mill officials, benefits to be derived from the work include easier and more complete cleaning—which will improve the cleanliness of the sheet, and added capacity to meet higher machine speeds. The installation has more than twice the capacity of the old equipment.

The New Order

An economic platitude was breathing its last recently, when Rayonier Inc. announced that it is now selling "substantial tonnages" of an advanced, new chemical cellulose to Sweden. The Scandinavian nation is historically a world supplier of chemical grades of wood pulp for cellophane, plastics, textiles and other growth cellulosics.

Paper Industry Ends Its Biggest Half-Year

The country's 10 billion-dollar paper and paperboard industry has completed the biggest six months in its history with its machines running close to 100 per cent of capacity.

At mid-year the papermakers were producing at an annual rate of about 32,000,000 tons, a jump of 7 per cent over last year's record pace and almost 20 per cent over 1954.

(The APPA has predicted that the 1956 total will be between 31,000,000 and 32,000,000 tons. As recently as two years ago surveys indicated that such a total would not be realized before 1960.)

The rapid demand increase has pushed the industry into its biggest expansion program in history, with construction expenditures scheduled for the next two years amounting to $1,300,000,000.

Newsprint manufacturers in the United States and Canada alone are undertaking a $350,000,000 two-year expansion that will boost capacity by 25 per cent.

A paper industry economist, Dr. Louis T. Stevenson, has forecast sales for the entire industry will climb from the current $10 billion annually to $14 billion by 1965 — if "we have no inflation."

Men prominent in papermaking have generally agreed that the industry is not over-expanding.

The APPA has cited figures that show that since the turn of the century paper and paperboard consumption has increased 15 fold, while the population has merely doubled.

Multi-Million Dollar Expansion Set by Nekoosa-Edwards Paper

A multi-million dollar two-year expansion program—including the installation of a new paper machine—has been approved by the board of directors of Nekoosa-Edwards Paper Co. in Port Edwards, Wis.

While final cost estimates are not complete, the over-all program involving new equipment and modification of existing facilities is expected to approximate $13,500,000.

Largest single item in the project will be the installation of a Beloit Iron Works paper machine at the Nekoosa mill. Designed to help meet the increased demand for writing, printing and business papers, the machine will trim 145 in. and operate at speeds up to 1500 fpm. Although

FROZEN PULPWOOD piles are not at all unknown to northern mills, but the freak formation pictured here is worthy of record. The phenomenon took place at the Cumberland Mills, Maine plant of S. D. Warren Co. For size comparison, note the man in the cab of the crane

some phases of the program are already underway, the paper machine and auxiliary equipment are scheduled for completion late in 1958.

A major part of the project calls for the construction of a wood room at the Nekoosa mill designed to handle separately hard and soft woods and produce bleached sulfate pulp from both species. Two new digesters will be installed to provide additional pulp capacity at the Nekoosa pulp mill. And to handle the increased capacity, an additional set of vacuum evaporators will probably be installed in the mill's recovery plant. A condenser will be added to produce hot process water for maintaining more uniform processing temperatures in the bleach plant.

To meet the market demand for additional brightness in fine papers, a chlorine dioxide stage is being added at the Nekoosa bleachery and will be completed early next year. An entirely new bleachery—permitting the bleaching of hardwood and softwood pulps concurrently—is now on the drawing boards.

The increased production will require greater power facilities. A new steam boiler and electric generator are planned for Nekoosa. In addition, it will be necessary to rebuild and modernize the entire electrical distribution system. Additional paper warehousing and finishing space is also planned for Nekoosa.

Modernization is also scheduled for the Port Edwards sulfite mill. While studies are not complete, the probable plan is to move an unused recovery furnace from Nekoosa to Port Edwards for the evaporation and burning of sulfite liquor.

Fort Howard Buys St. Regis Division

Fort Howard Paper Co. at Green Bay, Wis., has recently purchased the Towel & Toweling Div. of St. Regis Paper Co. The division is located at the St. Regis mill in Carthage, N. Y.

An official at Fort Howard has reported that material and equipment are being moved from Carthage to Green Bay and should be in operation in about a month.

Northern Paper Completes $2,000,000 Expansion

An expansion program costing in excess of $2,000,000 has been completed by the Northern Paper Mills Div. of Marathon Corp. at Green Bay, Wis.

No. 9 paper machine is in full-scale operation producing crepe toilet tissue. The unit, costing approximately $1,000,000, was built by Beloit Iron Works. One of the largest of its type in the world, it produces a 192-in. sheet at the rate of 2000 fpm. The dryer roll is 12 ft. in diameter and weighs about 184,000 lb.

The other major new facility at the Northern plant is a three-story in-process storage warehouse containing 140,000 sq. ft. and costing $1,000,000. The second and third floors are designed for the storage of jumbo parent rolls, containers and other materials used in the finishing process, while the first floor has space for finished products. Twenty-four railroad cars can be loaded simultaneously indoors. The building has a series of ramps that bridge the present railroad dock to connect with the manufacturing division.

Hudson to go Ahead With Florida Mill

A $25,000,000 newsprint mill of 100,000-ton annual capacity will be brought into production in 1958 at Palatka, Fla., by Hudson Pulp & Paper Corp. The plan was announced following a meeting between Hudson and officials of 14 southern newspaper publishers.

William Mazer, president of Hudson, announced that a newsprint machine has been ordered from Rice Barton Corp. He also reported that the publishers attending the Atlanta, Ga. meeting either already have or will sign contracts for the mill's output. "The South's rapid development and increased consumption of newsprint," Mazer continued, "have made it desirable for paper manufacturers to move into this area."

1955 Forest Fires at Post-War Low

Forest fires were at a post-war low in 1955, although man-made blazes occurred at the rate of 380 a day. This according to the United States Department of Agriculture.

Of the 145,180 forest fires reported last year, 134,800 were man-caused. The remaining were caused by lightning. The total acreage burned was 8,068,601. In 1954, 176,891 fires — of which 166,278 were man-caused — burned 8,832,963 acres.

The largest single cause of fires in 1955 was incendiarism — people still deliberately set fires for their own reasons, good or bad. They set 25,773 blazes on land receiving organized protection, which is the only land on which figures are available.

Contributing to the decrease in fires is the continued expansion of organized protection by the states under a federal-state cooperative program. The total area of state and private land under protection is at an all-time high of 387,156,000 acres.

Historically until 1942, forest fires increased proportionately with in-

creased public use. Since that time, although public use of forests has increased more than 150 per cent, the number of blazes has gradually decreased.

Finch, Pruyn Launches $4,500,000 Expansion

Ground was broken recently by Finch, Pruyn & Co. Inc. in Glens Falls, N. Y., for its $4,500,000 expansion program that will include a sulfite mill.

The project includes $1,000,000 for the development of company woodlands in the Adirondack Mountains. Cost of the new mill has been estimated at $3,500,000. The construction, which will make possible the processing of hardwood into pulp, is expected to be completed early next year.

Marathon Plans Big Expansion Project

Marathon Corp. announced recently that it plans to spend $132,000,000 for development and expansion in the period extending through the 1959 business year.

Of the amount, $82,000,000 will go toward normal growth, which will include replacement of worn equipment, purchase of new equipment, modernization, new manufacturing facilities and for a new corporate office building at Neenah, Wis. Part of the new equipment will be installed at Marathon's food package plant at Newnan, Ga.

The $50,000,000 balance will be devoted to the self-contained pulp mill, paper mill and converting plant that the firm is constructing at Naheola, Ala., and to southern timber holdings.

Tappi Corrugated Containers Conference Scheduled for St. Louis

Panel sessions and plant visits will highlight the Sixth Tappi Corrugated Containers Conference, which will be held October 17-18 at the Hotel Statler in St. Louis.

General conference chairman is J. J. Koenig of the Gaylord Container Corp. Div. of Crown Zellerbach Corp. H. T. Scordas of Union Bag & Paper Corp. is chairman of the Tappi Corrugated Containers Committee.

The opening session will have as its theme, "Multi-Color Printing of Corrugated Containers;" chairman-moderator will be W. P. Blamire of American Boxboard Co., Grand Rapids, Mich.

Speakers will include: Paul Fitzsimmons of Jas. H. Matthews Co., Pittsburgh; Robert Reid of the General Printing Ink Co. Div. of Sun Chemical Co., Kalamazoo; a representative of Hinde & Dauch Paper Co. Canada Ltd., Toronto, and a representative of F. X. Hooper Co. of Glenarm, Md.

The afternoon session on the first day will be devoted to, "Planning and Controlling Corrugated Production," with L. K. Burnett of Ohio Boxboard Co. as chairman-moderator.

Speakers will include: Robert Rabatsky of Hankins Container Co., Cleveland; J. W. Meinhardt of the Gaylord Div. of Crown Zellerbach and E. J. Bartlett of Union Bag & Paper.

The second day of the meeting will be given over to field trips to the plants of the Gaylord Div. of CZ and Alton Box Board Co.

NEW RAG ROOM installation at Byron Weston Co. in Dalton, Mass., which has mechanized and streamlined one of the last strongholds of hand operations. The bales of new rag cuttings—weighing up to 1000 lb. each—are mechanically lifted to sorting tables where each cutting is individually inspected. Sorted stock is deposited on a conveyor-type feed apron, which carries it to a Taylor-Stiles multiplex rag cutter operating at a speed of 32,400 cuts per minute

Anglo-Newfoundland to Build Newsprint Mill

A $60,000,000 newsprint mill will be constructed in northwestern Ontario by Anglo-Newfoundland Development Co. Ltd. The firm thus has taken up its option on timber limits granted about 18 months ago.

On completion of the mill, the provincial Lands and Forests Ministry will grant a license that specifies timber limits of 725 sq. mi. and selection of additional limits from an adjacent reserve area of 4500 sq. mi.—depending on the size of the mill and its "appetite."

Under the agreement, Anglo-Newfoundland must utilize a minimum of 150,000 cords of pulpwood annually. According to the *Wall Street Journal*, it has been estimated that the mill will have a daily capacity of more than 100 tons.

The mill will be located near Sioux Lookout, 175 miles northwest of Fort William.

Gaylord to Install South's First Continuous Digester System

The first commercial continuous digester system in a southern mill for producing kraft and hardwood pulps is being installed by Gaylord Container Corp. at Bogalusa, La.

Furnishing the unit is the Pandia Inc. Div. of Black-Clawson Co. It will boast a 15-in. diameter screw feeder, two 42-in. diameter digester tubes and a Pandia discharger. The top tube of the unit will be provided with the necessary equipment for recirculating the cooking liquor so as to take advantage of the latest pulping techniques.

While the new system is being in-

Take the guesswork out of drying...

. . . with a Cram Balanced Differential Dryer Drainage System. The Cram System assures maximum drying capacity . . . gradual, uniform drying of the sheet . . . holds predetermined moisture content of the sheet *automatically* with a minimum of variation.

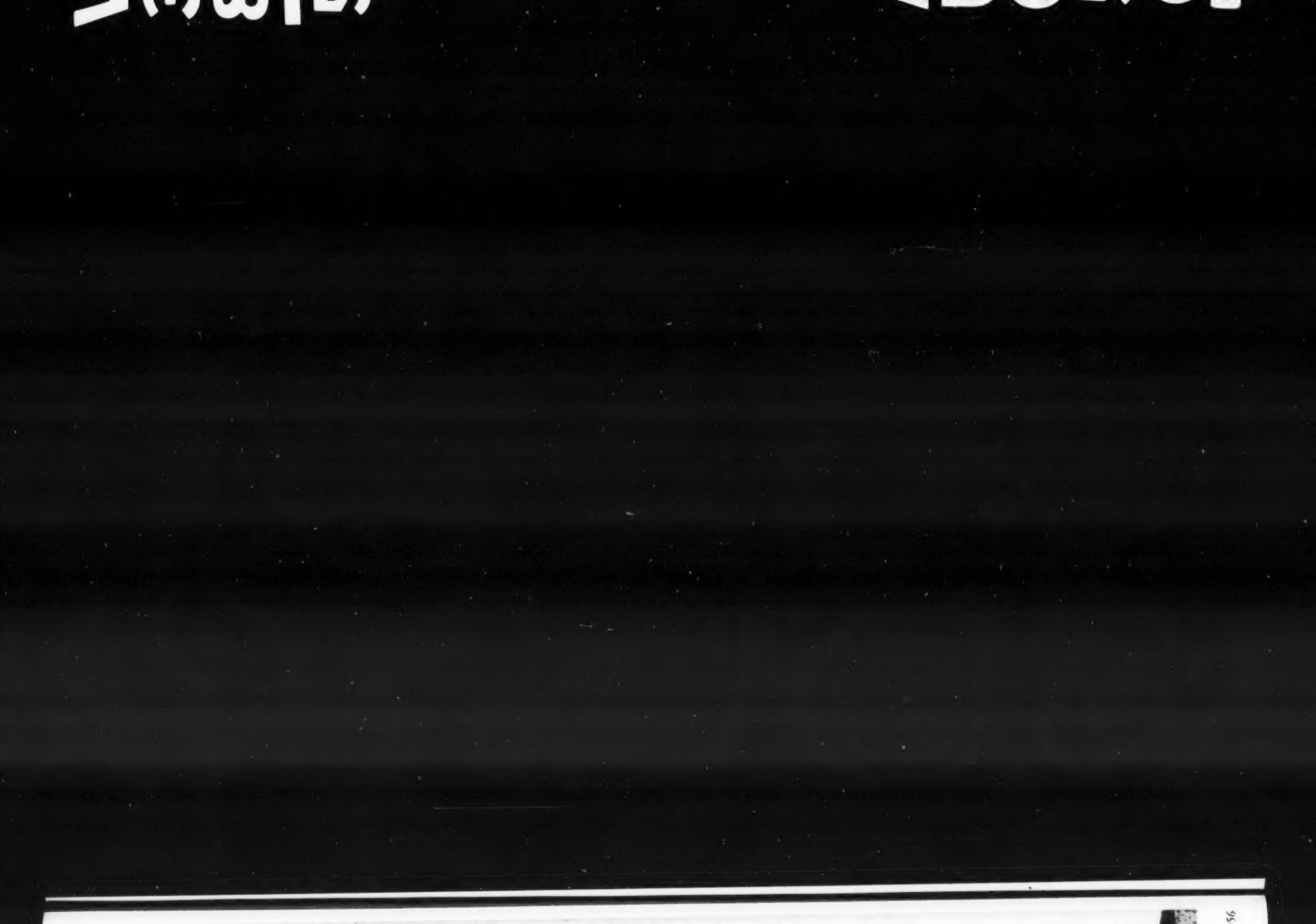
The Cram System is simply designed—no traps, heat recovery coils, flash tanks. It can be installed over a weekend shutdown, its cost is surprisingly low! . . . *and it's unconditionally guaranteed!*

Write or call your APPLETON representative for the new, descriptive booklet. See how the Cram System can enable *your* mill to dry paper faster, better, at lower cost.

The Cram Balanced Differential Dryer Drainage System is manufactured exclusively by

APPLETON MACHINE COMPANY

APPLETON, WISCONSIN



stalled primarily to produce neutral sulfite semichemical pulp from hardwood for corrugating board, Gaylord plans to conduct experimental runs with the equipment to produce various grades and types of kraft pulps. The firm in this way expects to obtain the necessary information for the production of such pulps from both gum wood and southern pine.

World's Record at Powell River Co.

A new world's record for newsprint production at a single mill was claimed recently by Powell River Co. Ltd.

The firm's eight paper machines produced 1259.2 tons in a 24-hour period to exceed the same plant's previous high of 1254.7 tons. The former record was established September 25, 1956.

Northwestern to Double Size in 18 Months

Northwestern Pulp & Power Co. Ltd., now constructing a $50,000,000 pulp mill at Hinton, Alta., will double in size within 18 months, according to Frank E. Ruben, chairman of the board.

The pulp mill is scheduled to go into operation in January. And plans are now being laid to double the size of the facility as soon as the "shakedown" period is completed. The pro-

GUARD RAIL normally used along highways and in parking lots is utilized by Finch, Pruyn & Co. Inc. to retain stacks of pulpwood. The Glens Falls, N. Y. company has 850 ft. of the Flex-Beam in use. The rail is supplied by Armco Drainage & Metal Products Inc.

What, actually, do Vacuum Pumps on paper machines handle?

Paper mill engineers know that it is actually a mixture of air and water vapor, but the custom of rating vacuum pumps in terms of air capacity alone causes this important fact to be frequently overlooked.

The presence of this water vapor causes a considerable reduction of the effective air handling capacity of any vacuum pump except the Nash. In the Nash Vacuum Pump the bulk of this water vapor is effectively condensed, due to the Nash operating principle. The air handling capacity of the Nash is therefore not reduced.

That is one of the reasons why Nash Vacuum Pumps are standard in over a thousand leading Paper Mills.

NASH ENGINEERING COMPANY

443 WILSON ROAD, SO. NORWALK, CONN.

posal would bring the cost of the complete development to more than $100,000,000. "We expect to start the second stage late in 1957 or in the spring of 1958," Ruben said.

Canadian Research Lab Planned for Quebec

New buildings valued at $2,250,000 and designed for pulp and paper research are to be constructed at Pointe Claire, Que. The federal government will build the laboratories for post-graduate education and research in various fields of science and technology.

The pulp and paper industry will lease the buildings from the Federal government and maintain and operate them.

For many years the government has been a contributing partner with the industry and McGill University in the support of the Pulp & Paper Research Institute, located on the McGill campus. Scientific apparatus valued at $1,000,000 will be transferred from the old buildings to the new laboratory.

Two of the Men Behind Eastwood Wires

FINAL EXAM

Here James Baney and Clarence Reed are making a final, inch-by-inch examination of a large fourdrinier wire. Though this is a final check, it is only one of many given it at every stage of its manufacture, from the casting of the alloys in our own foundry to the stretching table inspection shown above.

Because the Eastwood-Nealley plant is a *completely integrated* operation, every wire we ship has undergone thorough and continual analysis, control and testing from the raw metals to your finished fourdrinier wire ready for quality paper production.

We are proud to say they are *truly ours* — "from ingots to fourdrinier wire".

EASTWOOD-NEALLEY CORPORATION
Belleville, N. J.

Madison, Wis., to be Scene of Tappi Testing Conference

A principal speaker at the Seventh Annual Tappi Testing Conference will be J. Alfred Hall, director of the U. S. Forest Products Laboratory in Madison, Wis. He will speak on the future and direction of research at the laboratory.

Scene of the September 11-13 conference will be the Hotel Loraine in Madison. General chairman is E. E. Stephenson of Sutherland Paper Co.

Among the general session speakers will be: H. W. Verseput of Robert Gair Co. Inc., "Cylinder Ply-Bond Strength Testing;" C. E. Brandon, C. A. Bicking and G. L. Maton, "Precision of Tappi Standard Testing Methods;" E. F. Thode of the Institute of Paper Chemistry, Appleton, and B. Francis Kukachka of the Forest Products Laboratory, "New Method of Wood Identification."

In addition to the numerous regularly scheduled meetings of various committees, there will be a guided tour through the Forest Products Laboratory.

Recent Expansions in the Industry

Brown Co.
of Berlin, N. H., has purchased the plant of Blacfiber Pipe Co. in Corvallis, Ore. Blacfiber manufactures bituminized fiber pipe. The present capacity of the newly acquired mill will add about 10 per cent to the present production of Bermico sewer, drainage and irrigation pipe and electrical conduit, all of which is now being made at Berlin.

Allied Paper Division
of Thor Corp. has leased the facilities of the St. Regis Paper Co. mill in Kalamazoo. The lease is on a longe-term basis and includes a purchase option. Formerly known as Bryant Paper Co., the St. Regis mill was acquired by that firm in 1946 as part of a package deal with Time Inc. (Thor, a Chicago firm, acquired Allied Paper's property in Kalamazoo last December.)

Crown Zellerbach Corp.
has announced a newly-integrated division, the Western-Waxide Specialty Packaging Div., in an effort "to keep up with the national demand for special packaging materials such as waxed paper, foil, film, polyethylene-coated and laminated

papers." Western-Waxide combines the Western Waxed Paper and Waxide Paper Co. divisions. "The integration makes Western-Waxide a national organization," said R. O. Hunt, CZ vice president for operations.

Provincial Paper Ltd.,
wholly owned subsidiary of Abitibi Power & Paper Co. Ltd., has completed the five-year expansion program that tripled the capacity of its Thorold, Ont. mill. Now the largest white paper mill in Canada, the plant is running at an annual capacity of 48,000 to 50,000 tons of fine paper.

Union Bag & Paper Corp.
has awarded a contract for the construction of a corrugated box plant at Lakeland, Fla. Operation is scheduled for early October. Corrugated sheets made at the Union Bag plant in Savannah, Ga., will be shipped to Lakeland for fabricating into boxes primarily for use by the vegetable and citrus industry.

Southland Paper Mills Inc.
of Lufkin, Texas, will add a fourth newsprint machine to its plant. A third machine, scheduled for operation in July, was expected to bring the mill's annual production up to 200,000 tons.

Union Bag-Camp Paper Corp.
is the name adopted by the new firm resulting from the merger of Union Bag & Paper Corp. and Camp Mfg. Co. Stockholders of the two companies recently approved the action. (See THE PAPER INDUSTRY for July, page 319.)

J. & J. Rogers Co.
of AuSable Forks, N. Y., has awarded a contract for more than $1,000,000 for the purchase of papermaking machinery for the newsprint mill it will build at Silt, Col., near Glenwood Springs. The plant will be producing an annual 30,000 tons of high-quality newsprint by November 1957 with a machine on order from the Black-Clawson Co. J. & J. Rogers was high bidder at a recent auction on 3,000,000 cords of beetle-destroyed Engelman spruce on 275,000 acres in the White River and Routt national forests.

Sears, Roebuck & Co.
would take over control of United Wallpaper Inc. under a proposal announced recently by Frederick B. Heitkamp, president of Sears. Sears would receive 91 per cent of the shares of United common stock and all 60,000 shares of the Class A preferred stock. In return, the eight paint and wallpaper plants now owned by Sears would go into the United company.

Inland Container Corp.
will build a 128,000-sq. ft. plant at Ashtabula, Ohio, for the manufacture of corrugated shipping containers.

MacMillan & Bloedel Ltd.
will spend an additional $1,250,000 on its new $42,000,000 bleached kraft pulp mill at Harmac, B. C. The amount is for the construction of a woodroom.

Crown Zellerbach Corp.
is considering the construction of a 400-ton per day kraft pulp and paper mill in the Astoria, Ore. area. CZ owns 180,000 acres in tree farms in the vicinity and might pool that resource with 140,000 acres of county-owned tax delinquent land.

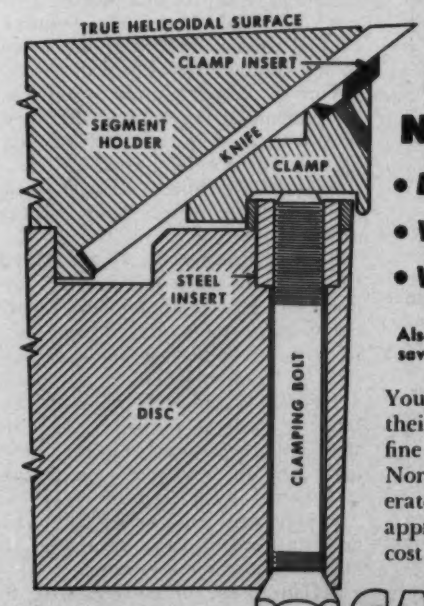
National Gypsum Co.'s
Anniston, Ala. paper mill was scheduled for completion in July. The multi-million dollar plant encompasses 155,000 sq. ft. Daily capacity will be nearly 200 tons of liner paper for gypsum wallboard. Scrap paper will be gathered from the Anniston, Atlanta, Birmingham and Chattanooga areas.

West Virginia Pulp & Paper Co.
has completed the installation of a $475,000 rotary kiln at its Covington, Va. mill. The kiln, said to be the largest of its kind in the United States, recovers chemicals from waste black liquor.

Hudson Pulp & Paper Corp.
has launched an expansion program designed to add 40,000 sq. ft. of manufacturing area to its multiwall plant in Pine Bluff, Ark. The addition will provide increased capacity, some storage space and room for new equipment. The expansion will give the plant a total of 107,500 sq. ft.

Scotian Paper Co.,
a wholly owned subsidiary of Bowater Corp. of North America Ltd., has announced that its offer to buy the assets of Mersey Paper Co. Ltd. of Liverpool, N. S., has been ac-

THIS SHOWS YOU WHY



the Knives in the Carthage Norman Chipper

- Last So Long
- Won't Come Loose
- Won't Change Position

Also note the inexpensive insert that saves wear on the more costly clamps.

You have to SEE the chips – see their quality – to appreciate the fine performance of the Carthage Norman Chipper. You have to operate this outstanding chipper to appreciate the low maintenance cost and long service life.

Write for Full Information

CARTHAGE MACHINE COMPANY
CARTHAGE, NEW YORK

cepted by Mersey shareholders. The purchase price is said to be slightly more than $53,000,000. It is reported that Bowater plans the construction of a groundwood pulp mill at the site with an annual capacity of about 100,000 tons. Mersey operates a newsprint mill with a daily capacity of about 440 tons.

The Alabama Pulp and Paper industry has plans to double its present production (2000 daily tons) by 1958, according to Jack W. Warner, executive vice president and treasurer of Gulf States Paper Corp. of Tuscaloosa. His estimate of 8000 more employees in the near future was based on the approximate need of four employees for each ton of paper produced. The forecast reflects the plans of mills in the state to invest some $170,000,000 in new construction and expansion of present facilities. (Approximately 40 per cent of the proposed expansion is to be for the manufacture of newsprint, the yield of which in tons per cord of wood is about twice that of sulfate paper.)

Robert Gair Co. Inc. and Continental Can Co. directors have agreed in principle on a basis for the merger of the two firms. Proposed terms call for an exchange of common stock at the ratio of eight-tenths of a share of Continental for each share of Gair. The merger will give Continental virtually complete coverage of the packaging market.

Allied News Briefs . . .

Completion of four more steps in its modernization program has been announced by **Appleton Woolen Mills** at Appleton, Wis. Equipment installation includes a loom, a picker-feeder, a stainless steel washer, a 300-in. napper and a 320-in. dryer. The $70,000, 600-in. loom enables the firm to boost felt production and at the same time furnish felts up to 300 in. in width.

Dorr-Oliver Inc. has announced a $900,000 expansion program for its plant at Hazelton, Pa. Greatly enlarged fabricating facilities will enable the firm to produce structural parts that have been sub-contracted to outside firms in the past.

Chicago Bridge & Iron Co. will build a steel fabricating plant at New Castle, Del. The plant is to be designed for the fabrication of field-erected storage tanks and similar structures.

Officers of **Hooker Electrochemical Co.** and **Oldbury Electro-Chemical Co.**, both of Niagara Falls, N. Y., have announced that they are negotiating for a merger of Oldbury into Hooker by the issuance of 450,000 shares of Hooker common in exchange for the 10,000 shares of Oldbury presently outstanding.

Hercules Powder Co.'s two new tall oil fractionation plants are expected to yield 115,000,000 lb. of rosin and fatty acids annually. One, at Franklin, Va., is now on a shakedown production basis, while the other, located at Savannah, Ga., is expected to start production soon.

Westinghouse Electric Corp. will build an addition to its new research laboratories, which are located 10 miles east of downtown Pittsburgh. The new wing will house facilities of the materials engineering department.

Philadelphia Quartz Co. of Philadelphia on July 20 marked the 125th anniversary of its founding. Company plants throughout the United States and Canada observed the event.

Lockport Felt Co.'s plant at Starkville, Miss., has been completely air conditioned by **Worthington Corp.**

West End Chemical Co. and **Stauffer Chemical Co.** have reported that their respective boards of directors have approved a plan of merger of West End into Stauffer. Formal agreement is to be submitted to stockholders for approval.

Graver Water Conditioning Co. has announced the opening of a new sales-service office in Boston to service the New England area.

Tidland Machine Co. of Camas, Wash., has established an export office at Jersey City, N. J.

Solvay Process Div. of Allied Chemical & Dye Corp. has announced plans to double the capacity of its mercury cell chlorine-caustic soda plant now under construction at Brunswick, Ga.

Heyden Chemical Corp. will construct a plant at Fords, N. J. Construction is scheduled to begin in the early part of 1957, and completion is planned by December 1, 1957. The plant will produce resorcinol by an improved process developed in Heyden's research laboratories.

Kylan Corp. of Spartanburg, S. C., has announced its new plant in Brunswick, Ga. The plant will be producing commercial quantities of deacetylated chitin.

Lunkenheimer Co., Cincinnati, Ohio pioneer valve manufacturer, has announced completion and opening of its new iron and steel plant. This is part of the multi-million dollar program for the consolidation and expansion of all manufacturing operations at its Fairmount site.

Whiting Corp. of Harvey, Ill., has acquired controlling interest in Streed Fabricating Co. of Attalla, Ala., and will double the size of the plant. Streed produces transite line pipe and fittings, flanges, stainless steel pipe and fittings, processed piping and fittings, etc.

Coming Events

Tappi

Sept. 11-13—Seventh Testing Conference, Loraine Hotel, Madison, Wis.

Sept. 24-26—Third Lignin Round Table, Appleton, Wis.

October 3-4—Eleventh Plastics-Paper Conference, Institute of Paper Chemistry, Appleton, Wis.

Oct. 8-11—Eleventh Engineering Conference, Sheraton-Plaza Hotel, Boston, Mass.

Oct. 12-13—New England (joint meeting with Conn. Valley Div. APPMSA), Curtis Hotel, Lenox, Mass.

Oct. 17-18—Sixth Corrugated Container Conference, Hotel Statler, St. Louis, Mo.

American Pulp & Paper Mill Superintendents Association

Sept. 6-8—New York-Canadian Div., Sheraton Brock Hotel, Niagara Falls, Ont., Canada.

Sept. 20-22—Northwestern Div., Poland Spring House, Poland Spring, Maine.

Sept. 21-22—Northwestern Div., Wausau, Wis.

Oct. 5-6—Penjerdel Div., Bedford Springs Hotel, Bedford Springs, Pa.

Oct. 12-13—Conn. Valley (joint meeting with New England TAPPI), Curtis Hotel, Lenox, Mass.

Oct. 17-19—Southern and Southeastern Div., (joint meeting), Francis Marion Hotel, Charleston, S.C.

Other meetings

Aug. 20-31—Program in Disposal of Industrial Wastes by Bio-chemical Processes, Mass. Institute of Technology, Cambridge, Mass.

Sept. 10-12—18th Annual Forum of Packaging Institute, Hotel Statler, Cleveland, Ohio.

Sept. 10-16—The Perkin Centennial, sponsored by the American Association of Textile Chemists and Colorists, Waldorf Astoria, New York.

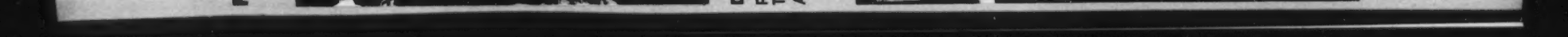
Sept. 16-21—130th National Meeting of the American Chemical Society, Atlantic City, New Jersey.

Sept. 17-19—National Paper Trade Association, Conrad Hilton, Chicago, Ill.

Oct. 22-25—Eleventh Annual Protective Packaging and Materials Handling Exposition, Kiel Auditorium, St. Louis, Mo.

Oct. 29-30, Nov. 1—Electrochemical Society, Statler Hotel Cleveland, Ohio.

Archive

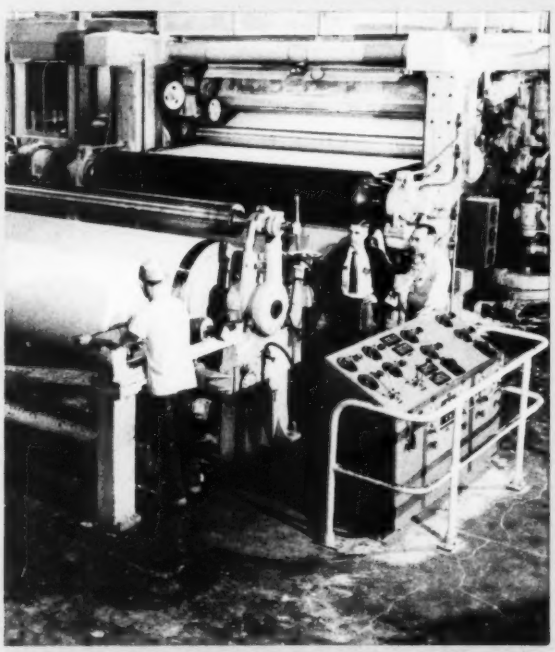


The Beloit Album

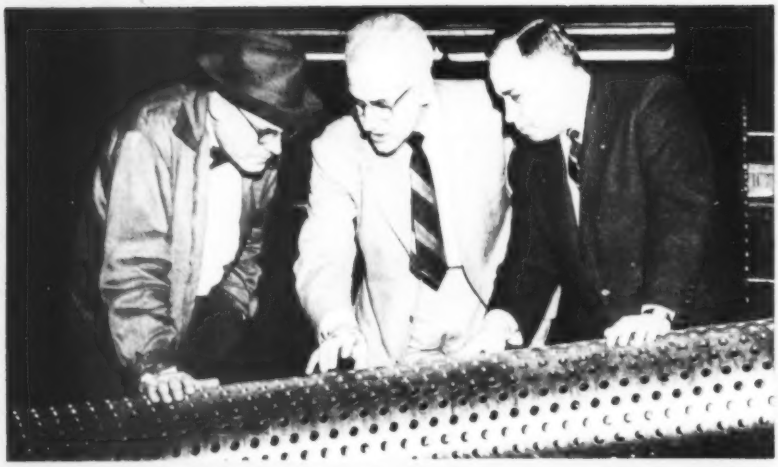
Papermaking progress as seen by the Beloit camera's roving eye

DESIGN DISCUSSION at Beloit Iron Works, Beloit, Wisconsin, includes *(left to right)* John Huppler, Kimberly-Clark Corporation, Charles Campbell, Coosa River Newsprint Company, Freeman Nichols and George Lundstrom of Kimberly-Clark. They are shown discussing the design of Coosa's new wide high-speed news machine with Sterling Skinner *(center)*, Beloit's Assistant Chief Engineer.

GEORGIA KRAFT COMPANY's Master Mechanic Jack Frost *(left)*, and Plant Engineer Dick Gallop *(center)*, during a recent visit, stop on Beloit's main Erecting Floor to examine slice arrangement on a secondary head-box with Beloit General Welding Foreman Howard Rosenow.



STERLING PULP AND PAPER Company's mill Superintendent, A. W. Mierow *(center)* and Chief Engineer C. E. Bieber *(right)* at reel position of Sterling's new 133" Tissue Machine. Pneumatic reels maintain desired nip pressures, preserve bulk and crepe throughout roll build-up.



MOSINEE PAPER COMPANY's General Superintendent Robert Rusch *(r)* examines a centrifugally cast heavy wall stainless steel rectifier roll. Mr. Rusch is with Fred Erbach *(c)*, Beloit Sales Engineer, and Charles Petrof, Chief Inspector.

OPERATION OF MOTOR DRIVEN RIDER ROLL and slitter assembly for Beloit Model "L" winder is explained in detail to visitors from South America *(left to right)* Mr. Heinonen and Mr. Petaja by Beloit Sales Engineer Paul Pringle.

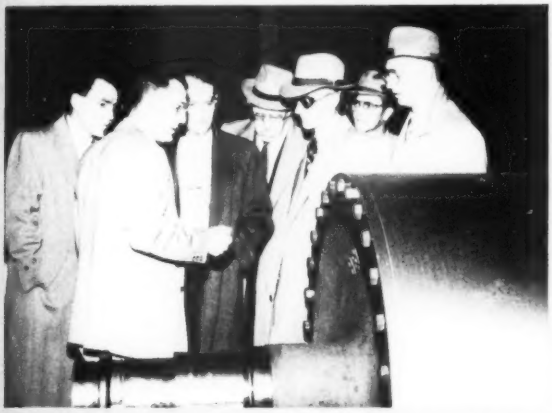
Visitors Welcome

Visitors are always welcome at Beloit Iron Works. Pictures of some of our recent guests appear on these pages. While the majority of our visitors are customers, here to talk over design details, we also have the pleasure of meeting with other interested parties —students, heads of corporations, technical groups, and the like. We at Beloit feel that personal contact is essential. It's one of the most pleasant parts of our job—meeting old friends, making new ones, talking over specific problems, and in general helping to make Beloit more truly "your partner in papermaking."

Foundry Expansion

Below is a view of the Beloit Iron Works Foundry most visitors do not see. Photographed from the Rock River side, the structure reveals the scope of Beloit's foundry expansion program, 1956. At far right is framework for the enlarged main foundry bay, the new dryer and roll-casting shops, and the corebox storage area. In the foreground is the new coreroom which will be occupied by the time this issue of the Beloit Album reaches you. Foundry expansion, including new melting, molding, and sand system facilities, will be completed by fall. This project will provide 100,000 additional square feet of foundry space, more than enough to offset the demand for castings created by the machine shop expansion.

A TOUR GROUP of 100 Junior Mechanical Engineering students from the University of Wisconsin seemed to find much of interest on a recent visit to Beloit Iron Works. Group above has stopped at a six-foot radial drill to watch the drilling of a five-size differential drive gear case.



VISITORS from the Madison Chapter, American Welding Society, stop in Beloit's Dryer Shop to examine a 60-inch paper dryer. The Welding Society visited Beloit for a first-hand view of advanced welding techniques used by Beloit in the manufacture of modern papermaking machinery.

VISITOR FROM FINLAND, Erkki Berner, Manager of Enso Gutzeit's Summa mill, and Beloit Sales Engineer A. G. Olson *(left)*, examine a cheeking piece similar to one on new Summa news machine. Beloit has built six papermaking machines for Enso Gutzeit since the end of World War II.

MEMBERS OF THE YOUNG PRESIDENTS Organization and their wives recently visited Beloit Iron Works. Shown in the plant *(l. to r.)*: Mr. and Mrs. A. H. Lambrecht, Mr. and Mrs. A. W. Adams, Dr. Miller Upton, President of Beloit College, guide T. M. Jones, and Mr. and Mrs. Robert Rice.

FOUNDRY OPERATIONS are a high point of any shop tour. Tappi members standing on the foundry balcony get a bird's-eye view of the pouring of a 60-inch paper dryer. More than 200 members of the Lake States Chapter of Tappi visited Beloit, from mills in Ill., Mich., and Wis.

your partner in papermaking

BELOIT

PAPER MACHINERY

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WHEN YOU BUY BELOIT..YOU BUY MORE THAN A MACHINE

J. W. MILLER

20-TON LIFT. Ira E. Williams, night foreman, Suction Roll floor, checks the front-end lifting arrangement on a 44-inch diameter suction couch roll. Front-end lifting is a new method of cantilevering these rolls. The operator raises the tending side by simple mechanical means, and a spacer block is inserted between the rear couch journal and a jack-stand to hold the couch in its cantilevered position. Beloit introduced the revolutionary cantilever-type suction couch roll more than a quarter of a century ago. Continuous efforts to improve design, precision, and efficiency of operation have made possible trouble-free, high-speed, profitable production records. Front-end lifting is another development in Beloit's continuing program to improve design for better service to the pulp and paper industry. *Beloit Iron Works, Beloit, Wisconsin—Since 1856.*

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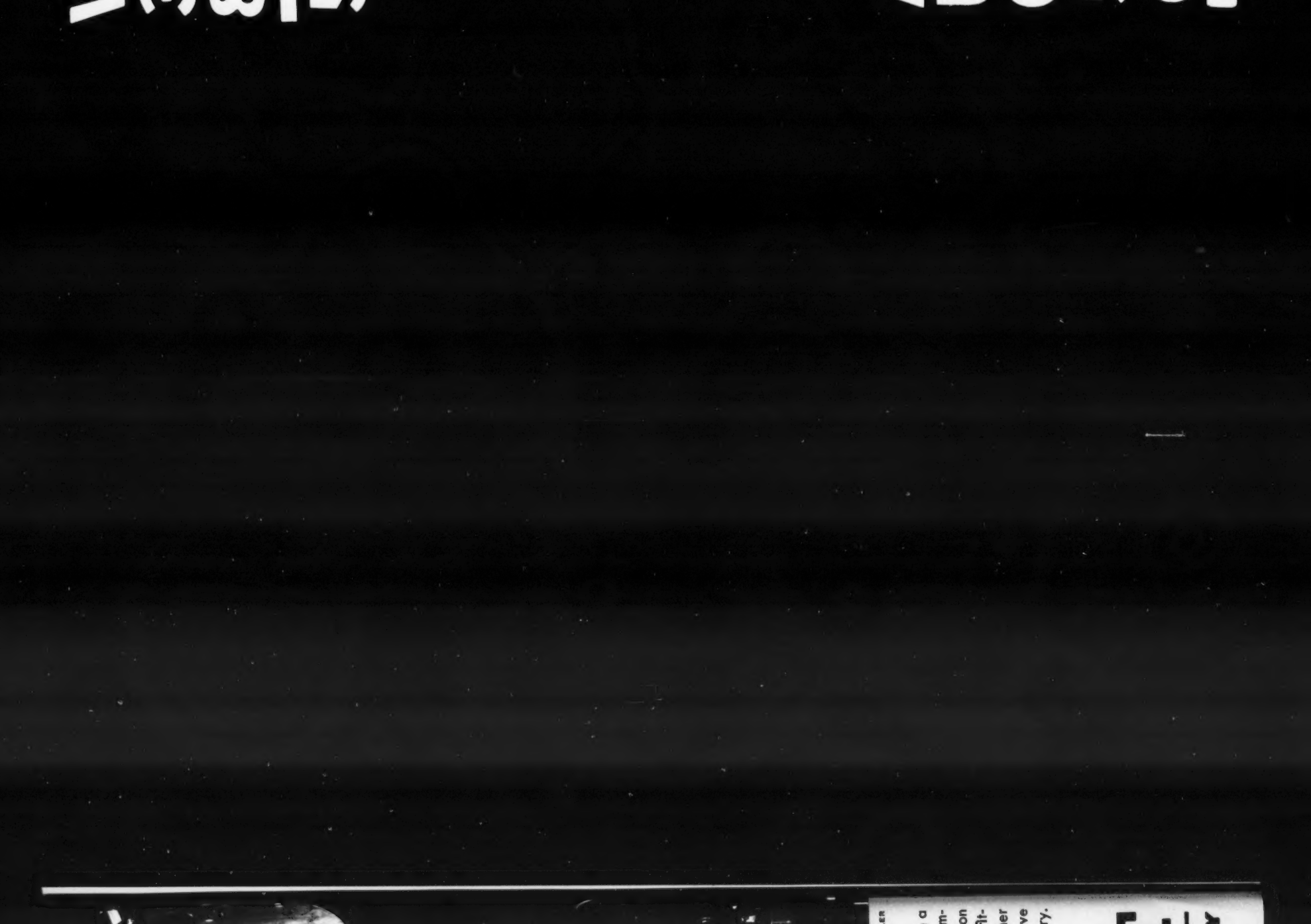


NAMES in the NEWS

Upson Elects

The election of James J. Upson to the presidency of Upson Co. in Lockport, N. Y., was recently announced by the firm. He succeeds his father, W. Harrison Upson Jr., who had served as president of the wallboard company since 1947.

W. H. Upson was elected board chairman to succeed his brother, Charles A. Upson, who had held the position for nine years and will continue on the board.

Other new officers elected are: Kenneth A. Boos, comptroller and secretary; R. George Morgan, vice president for sales; Dr. Walter P. Fricks, vice president and research director; Walter H. Meier, treasurer and assistant secretary; Richard D. Eastridge, assistant vice president for sales, and Averill E. Calver, director of advertising and public relations.

Cornell Advances Six

Cornell Paperboard Products Co. of Milwaukee has created two new senior vice presidential posts and has advanced four men to the office of vice president.

Wesley W. Race was named senior vice president for paperboard, and Randall A. Ross was appointed senior vice president for cartons and containers.

Those newly named vice presidents are: Frank G. Osborne, vice president and secretary-treasurer; C. Edward Lindgren, vice president for folding cartons; Theodore L. Seith, vice president for shipping containers, and George L. Petersen, vice president, Cornell plant.

Union Bag Promotions

Malcolm L. Taylor, Technical Div. manager for Union Bag & Paper Corp. at Savannah, Ga., has been named technical director for the entire firm, with offices in New York, N. Y.

At the same time, it was announced that J. R. Lientz has assumed the position of Savannah resident manager. He was formerly in charge of Savannah operations and succeeds T. T. Dunn, recently made executive vice president for manufacturing.

Succeeding Taylor as manager of the Technical Div. is G. C. Kimble, for the past four years assistant division manager. Becoming assistant manager is W. C. Chapman, superintendent of mill technical. R. R. Chase, assistant superintendent of mill technical, becomes superintendent of mill technical. And Horace Robson, group leader in mill technical, replaces Chase as assistant superintendent.

George A. Oechsle Jr. has been appointed assistant manager of the American Coating Mills Div., Elkhart, Ind., of Robert Gair Co. Inc. Mr. Oechsle joined Gair in 1946 and became assistant mill superintendent of the Gair Cartons Div., Piermont, N. Y., in 1950. In 1952 he was promoted to mill superintendent at Piermont.

Randall Preston has been appointed safety director for Allied Paper Mills of Kalamazoo, Mich., a division of Thor Corp. He was formerly assistant personnel and safety director for the Panelyte Div. of St. Regis Paper Co. of Kalamazoo.

Randall Preston

G. V. Bayly

George V. Bayly has been named general manager of the Carton Div. of Ohio Boxboard Co. He was formerly sales manager of the Carton Div.

Thomas M. McCrary has been named assistant to the vice president in charge of personnel in the New York office of West Virginia Pulp & Paper Co. **Delbert C. Valentine** will succeed Mr. McCrary as industrial relations co-ordinator.

R. W. Hovey

W. H. Chisholm

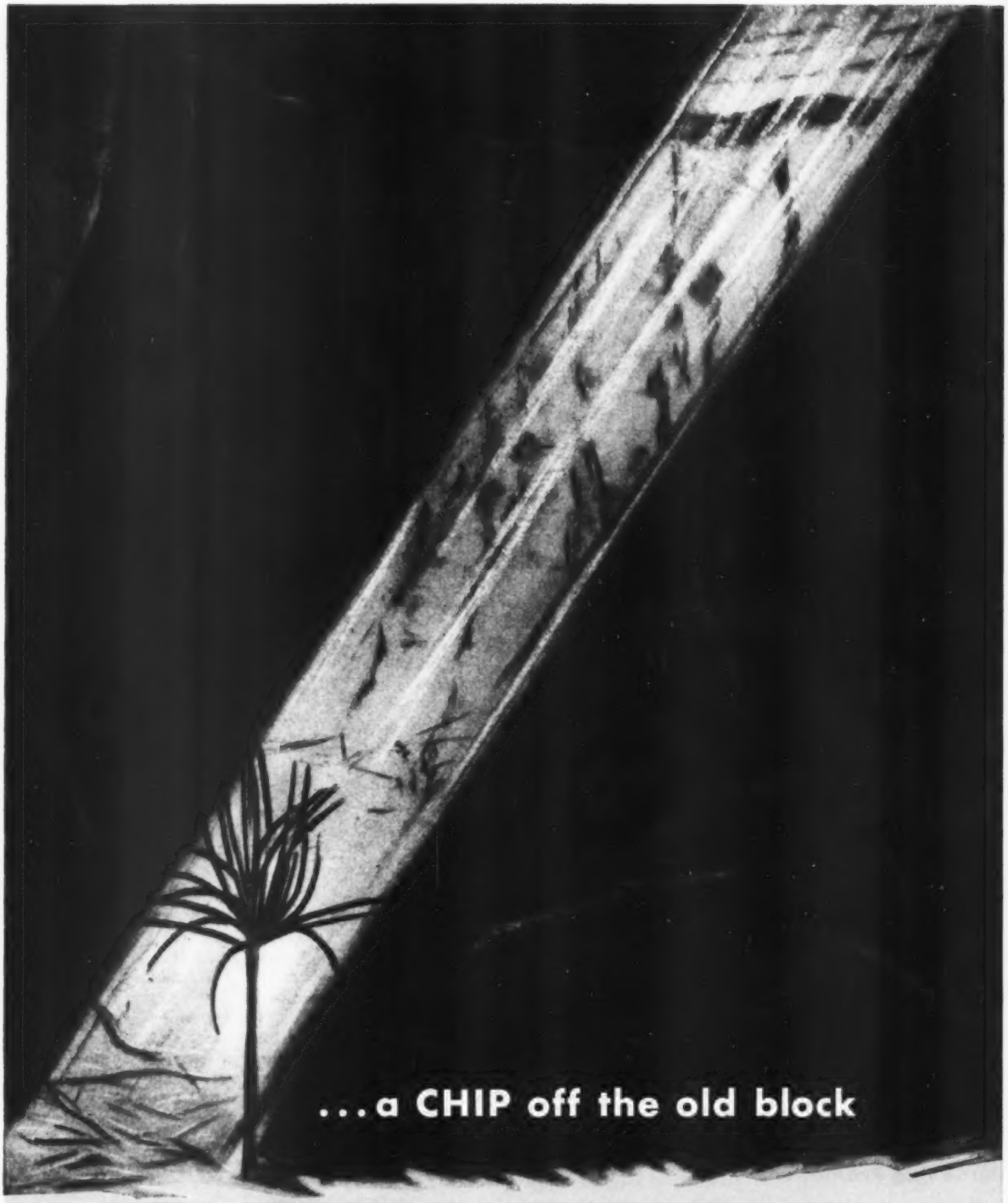
Oxford Paper Co. has reported that **Rex W. Hovey**, formerly executive vice president, has been elected board chairman; while **William H. Chisholm**, formerly vice president, was named president of the firm.

Edward F. Fletcher has retired as purchasing agent of Hammermill Paper Co. of Erie, Pa. He has been succeeded by Herman C. Weber, formerly assistant purchasing agent. Fletcher joined the organization in 1907 and was the mill's third oldest-in-service employee. He had been purchasing agent since 1916.

The board of directors of Robert Gair Co. Inc. has elected an executive committee of six directors to exercise certain of the functions previously performed by the board itself. Committee members are **George E. Dyke**, chairman and president; **Raymond F. DeVoe**, senior vice president; **Robert L. Fitts**, vice president for kraft bag and paper operations; **Harry E. Collin**, senior partner of Collin, Norton & Co.; **Hugh C. Laughlin**, executive vice president of Owens-Illinois Glass Co., and **Parker Newhall**, partner in the firm of Kelley, Drye, Newhall & Maginnes.

Carl F. Woods, board chairman of Swank Inc., has been elected director of Champion-International Co. Mr. Woods is the third new director to be added to the firm's board this year.

Bruce G. McAbery, former labor relations manager, has been named director of industrial relations of Hinde & Dauch Paper Co. He replaces **D. C. Valentine**, who has been



Weyerhaeuser Timber Company renews forest crops by providing continuous natural reforestation. Constant growth is accomplished with seed supplied from blocks of trees left standing to re-seed adjacent harvested areas. The enlightened practice of seeding or planting burned-over land with nursery-grown seedlings also assures healthy harvests for future generations.

Forest life is renewable and continuous. Weyerhaeuser Timber Company, while supplying woodpulp to paper and allied industries, methodically works with Nature's growing cycle in perpetuating forest crops, thus achieving a sustained yield of pulpwood—in a continuing cycle.

WEYERHAEUSER

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Names in the News . . .

promoted to co-odinator of industrial relations at West Virginia Pulp & Paper Co. (Hinde & Dauch is a subsidiary of West Virginia.)

George T. Henderson has been appointed assistant to the president of Hinde & Dauch Paper Co. at Sandusky, Ohio. He was formerly district sales manager at Detroit.

G. T. Henderson

D. B. Kuhe

David B. Kuhe, former director of expansion and development for Crossett Lumber Co., has been named vice president in charge of manufacturing for Hudson Pulp & Paper Corp.

James A. Wise, president of Kalamazoo Paper Co., has been appointed to fill a vacancy on the board of directors of KVP Co.

J. A. Wise

Frank Dickinson

Frank Dickinson, cost and statistics manager for West Virginia Pulp & Paper Co., has been elected comptroller of Hinde & Dauch Paper Co. of Canada Ltd., a Westvaco subsidiary.

Preston C. Read has been appointed mill manager at the Ocean Falls (B. C.) Div. of Crown Zellerbach Canada Ltd. Mr. Read was previously with Consolidated Paper Corp. Ltd.

Robert O. Beatty joins Western Kraft Corp. as assistant to President **Ira C. Keller.** Beatty moves to the

Look Overhead . . . see "NORTHERN"

Paper Mill Crane designed for future wider span

This 59-foot span NORTHERN CRANE was recently installed in a newly built paper mill in North Carolina.

To provide for a possible future expansion and rebuilding of this mill, the crane has been designed and built so that it may be lengthened to approximately double this original span.

This installation reflects Northern's long, comprehensive experience in designing and building overhead electric cranes to deliver the particular services required by the paper mill industry; and to assure fast, safe, dependable operation in the wider bay buildings now preferred for industrial manufacturing.

Let us send you Bulletins G-700 and HL-115

NORTHERN MATERIALS HANDLING EQUIPMENT

NORTHERN ENGINEERING WORKS
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Names in the News . . .

papermaking firm from Crown Zellerbach Corp., where he has been northwest public relations representative since 1953, with headquarters in Portland.

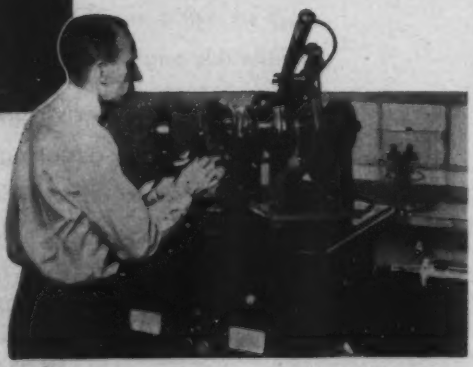
Allied Paper Mills of Kalamazoo, Mich., a division of Thor Corp., announces two executive appointments. **John Dam,** formerly general superintendent of Monarch Book Mill, becomes Allied's chief chemist. **Morris Carl,** formerly assistant general superintendent of King Book Mill, has been named general superintendent of Monarch.

Philip C. Brownell, vice president of Ecusta Paper Corp., has been named general manager of the Ecusta Paper Div. Before joining Ecusta he was general counsel for the War Labor Board and the National Wage Stabilization Board.

C. A. Fourness, assistant to the executive vice president of Kimberly-Clark Corp. since 1953, reached retirement age May 18 after 41 years with the company but will continue to work at K-C's new Mexican plant until the end of 1956. Mr. Fourness holds about 38 patents on machines, products and processes, either of his own invention or in collaboration with other K-C men. He joined the firm in June 1915.

AT THE DROP OF A HAT!

Well, perhaps, not quite as hastily as that, but Lindsay never loses any time about adding equipment which promises to improve the quality of its Fourdrinier wire cloth. Two recent examples are pictured here. Always, of course, the objective is better wires for better paper. The Lindsay Wire Weaving Company, Cleveland 10, Ohio.



This X-Ray spectrograph is used to investigate the chemical uniformity of the wire to be woven into Fourdrinier wire cloth. It provides for rapid, accurate quantitative determination of the elements, both those present as major constituents and those present as traces in the alloys used.

This X-Ray diffractometer is used to study the internal structure, as well as surface conditions of wire, woven cloth, and used sections of Fourdrinier wires returned from customers' mills for examination.

LINDSAY WIRES Since 1904

FOR PAPER MANUFACTURING

Allied Personalities

John G. Seiler, general sales manager, has been elected president of Tube Turns of Louisville, Ky., a division of National Cylinder Gas Co. He succeeds George O. Boomer, who has retired.

John G. Frischkorn has been appointed district sales manager by the Cleveland Tramrail Div. of Cleveland Crane & Engineering Co. He was formerly a design engineer.

George L. Brown, formerly director of purchases, has been named to the newly created post of vice president for purchasing at F. C. Huyck & Sons.

Al W. Roth, sales engineer in the Southwest, has been named manager of the new Large Propeller Div. of Aerovent Fan Co. Inc.

David Brittain has been appointed to the post of executive vice president of Mead Pulp Sales Inc. Formerly with the firm in Chicago, he will headquarter in New York, N.Y.

Herbert H. Rogge, formerly president of Canadian Westinghouse Co. Ltd., has been named executive vice president of the American Car & Foundry Div. of ACF Industries Inc.

Robert R. McKellar, formerly of the New York office, has been transferred to the Chicago office of J. O. Ross Engineering Corp. He will serve as a sales engineer in Minnesota and western Wisconsin.

Pusey & Jones Corp. has announced reassignment of sales engineering personnel: **Albert Palmer Jr.,** eastern seaboard south of Washington; **W. Lewis Conner,** Southwest; **Alex McInnes,** Midwest; **Harrison J. Farra Jr.,** New England; **William A. Strickler,** middle Atlantic.

Fischer & Porter Co. has announced three sales department promotions: **Philip E. Sellers,** formerly

sales manager, becomes sales vice president; **Herman Kockritz,** formerly southeastern divisional manager, becomes field sales manager, and **William Trethaway,** formerly sales engineer, becomes district manager of the Atlanta office.

The National Aniline Div. of Allied Chemical & Dye Corp. has named **John J. Reed** product manager for isocyanates and **M. S. Rhodes** product manager for resin chemicals. Rhodes was formerly a chemical intermediates salesman and Reed a nylon plastics coordinator.

J. O. Ross Engineering Corp. has announced a number of changes in executive personnel: **C. J. Schmidt,** formerly sales vice president, was named executive vice president; **W. K. Metcalfe,** secretary, was elected a director and vice president for sales, and **J. M. Petix,** a member of the sales engineering staff, was elected secretary.

L. S. Wilcoxson, vice president of Babcock & Wilcox Co., has been elected to the board of directors. He will continue to be in charge of the company's boiler division.

Consultant engineer **John G. Rearick** has withdrawn from active service at Warren Steam Pump Co. Inc. He joined the company in 1924 and has served in various capacities such as chief engineer and vice president. He will remain as a member of the board and in a consulting capacity.

Raymond L. Howerton has been named to the position of assistant manager, sales promotion department at Hyster Co. He has been with the company six years.

Richard E. Whinery, general manager of Link-Belt Co.'s Ewart plant in Indianapolis, has been elected a vice president of the company.

Barrett Div., Allied Chemical & Dye Corp., New York, has announced the appointment of **Thomas P. McGuinness** as supervisor of engineering, chemical products. He has been with the company since 1945 as project engineer.

The appointment of **Robert J. Casey** as divisional manager of paper clays division, industrial products department, J. M. Huber Corp. has been announced. He was formerly assistant divisional manager and technical sales representative.

Necrology . . .

Edith Stroschneider

Edith Stroschneider, 66, librarian emerita and editor of *Library Notes* at the Institute of Paper Chemistry in Appleton, Wis., died June 29 after a short illness.

Miss Stroschneider was born in Vienna and attended Studley Horticultural College in England. She came to the United States from Canada in 1931 and joined the Institute staff. Her linguistic ability led eventually to technical library work.

Hardy S. Ferguson

Hardy S. Ferguson, a prominent figure in the paper manufacturing industry, died July 6. Mr. Ferguson was chief engineer of Great Northern Paper Mills at Millinocket, Maine. When leaving Great Northern, he moved to New York to establish Hardy S. Ferguson & Co., consultants to the paper manufacturing industry. This firm was dissolved in 1950.

Thomas McLaren

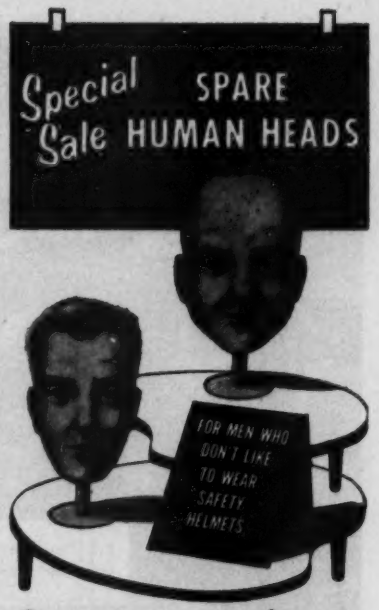
Thomas McLaren, a director of Crown Zellerbach Corp. and retired vice president and treasurer, died June 21. Mr. McLaren joined CZ in 1930 as vice president and treasurer. He retired from active management in 1951, but continued as a director and consultant.

Louis Kupfer, retired president of Kupfer Bros. Co. Died June 24.

Edward S. Houlehan, retired treasurer of Rhinelander Paper Co., died June 17 after a brief illness. He was the paper firm's first treasurer and had worked for the company for 36 years.

Philip Arnold, retired vice president of Garlock Packing Co., Palmyra, N. Y., died July 3. He served the firm for 48 years. In 1929 he became vice president of sales. He retired on July 1.

Richmond C. Quortrup, assistant manager of the chemical sales department of the Barrett Div. of Allied Chemical & Dye Corp., died in May after a long illness. He was 57. Mr. Quortrup had spent his entire business career with Barrett, having started as an office boy in 1917.



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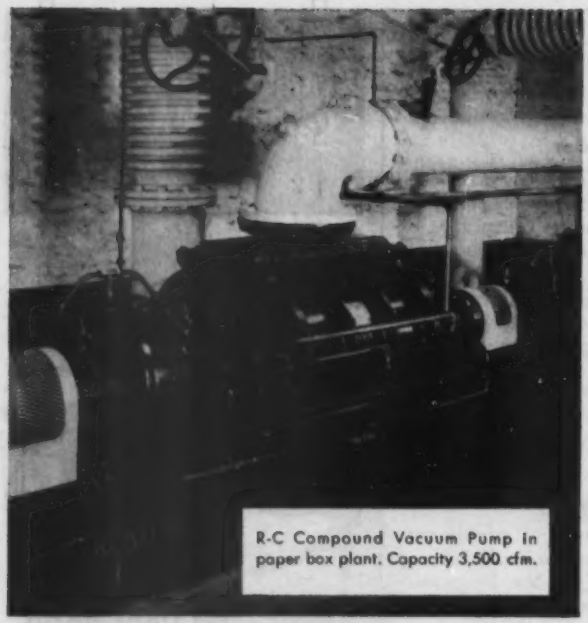

R-C Compound Vacuum Pump in paper box plant. Capacity 3,500 cfm.

R-C *plur-ability* VALUES IN VACUUM PUMPS

Successful performance of Roots-Connersville Vacuum Pumps results from this combination of values, all of which are found only in R-C equipment.

- **Reduced horsepower at higher speeds** (514 rpm and up) creates power savings up to 25% and far lower first cost of motors.
- **Single-stage or two-stage units** in size ranges for all requirements.
- **Long-time reliability and low maintenance** no internal contacts or excessive wear. Almost complete freedom from down-time and maintenance.
- **Small floor space** less expensive foundations. Lower cost per cubic foot capacity. Adaptable to crowded space.
- **Minimum sealing water** from 4 gpm. to 40 gpm. Efficiencies not affected by changes in water temperature.

To be sure of these *plur-ability* factors, check into the advantages of R-C Vacuum Pumps for new machines or replacements. Details in Bulletin 50-B-13.

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PATENT REVIEWS

MELVIN NORD*

Process for sizing paper with polyethylene

U. S. 2,739,058, issued March 20, 1956, to Denis J. O'Flynn and Donald G. Pye, assigned to E. I. du Pont Nemours & Co., describes a process for sizing paper by adding a sizing agent to the paper ingredients, in the beater stage of paper manufacture, or by means of a tub-sizing operation.

Instead of using rosin in sizing paper, an aqueous dispersion of submicroscopic particles of a normally solid polyethylene is used, the pH being preferably 5.5 to 6.0. An advantage claimed is that a pH higher than 5 may be used, since a low pH causes corrosion as well as lack of permanence in the end product.

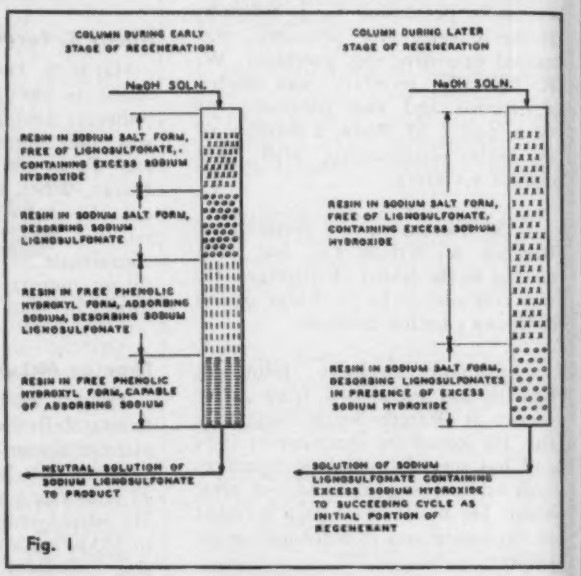

COLUMN DURING EARLY STAGE OF REGENERATION
NaOH SOLN.
RESIN IN SODIUM SALT FORM, FREE OF LIGNOSULFONATE, CONTAINING EXCESS SODIUM HYDROXIDE
RESIN IN SODIUM SALT FORM, DESORBING SODIUM LIGNOSULFONATE
RESIN IN FREE PHENOLIC HYDROXYL FORM, ADSORBING SODIUM, DESORBING SODIUM LIGNOSULFONATE
RESIN IN FREE PHENOLIC HYDROXYL FORM, CAPABLE OF ADSORBING SODIUM
NEUTRAL SOLUTION OF SODIUM LIGNOSULFONATE TO PRODUCT
COLUMN DURING LATER STAGE OF REGENERATION
NaOH SOLN.
RESIN IN SODIUM SALT FORM, FREE OF LIGNOSULFONATE, CONTAINING EXCESS SODIUM HYDROXIDE
RESIN IN SODIUM SALT FORM, DESORBING LIGNOSULFONATES IN PRESENCE OF EXCESS SODIUM HYDROXIDE
SOLUTION OF SODIUM LIGNOSULFONATE CONTAINING EXCESS SODIUM HYDROXIDE TO SUCCEEDING CYCLE AS INITIAL PORTION OF REGENERANT

Fig. 1

Adsorption of lignosulfate from solution by ion exchange resins

Lignosulfate may be adsorbed from sulfite waste liquor by means of a porous insoluble ion exchange resin. The process is described by Lloyd E. Van Blaricom, Kenneth R. Gray, and Frank G. Ward, in U.S. 2,727,029, issued Dec. 13, 1955, and assigned to Rayonier Inc.

Cross-linked resins containing phenolic hydroxyl groups are used in the adsorption step. While such resins normally act only as cation exchange resins, they have now been found to adsorb the entire lignosulfate molecule, including the pulping-base cations present (e.g. Na^+, Ca^{++}, or NH_4^+). Evidently the adsorption is not a true ion exchange process.

It has also been found that the adsorbed lignosulfate material may be removed from the resin by treatment with an alkaline solution, thereby recovering lignosulfate in substantially sugar-free condition. The regeneration step is shown schematically in Fig. 1.

Utilizing the dry content of sulphite waste liquor

U. S. 2,738,270, issued March 13, 1956 to Bjorn A. Nelson and Nils V. Mannbro, describes a process of utilizing the organic content of sulphite waste liquor for fuel.

In the soda or sulphite cooking of wood pulp, black liquor is obtained as a waste product. In order to reclaim the sodium compounds of the black liquor and simultaneously utilize the dissolved organic matter as fuel, the black liquor is evaporated. The

*Patent attorney, 17600 Pinehurst, Detroit 21.

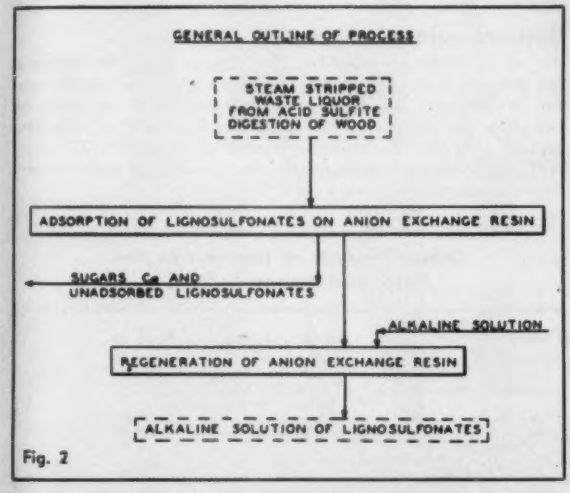
evaporated liquor is injected into a furnace where the organic substances are burned while the inorganic substance remains as an ash known as soda smelt. Normally, this soda smelt is dissolved in water to form an aqueous liquor called green liquor. To this liquor, burned lime is added to causticize the liquor, causing the following reactions:

$$CaO + H_2O \rightarrow Ca(OH)_2$$
$$Na_2CO_3 + Ca(OH)_2 \rightarrow NaOH + CaCO_3$$

The calcium carbonate settles and is separated from the causticizing liquor, which is used as cooking liquor for a new cook.

In the present process, the improvement consists of dissolving the soda smelt in sulfite waste liquor instead of in water. The solids contained in the sulfite waste liquor pass into the digestors and out with the black liquor.

The advantage is that it eleminates the need of evaporating the sulphite waste liquor in order to utilize its combustible solids as fuel. Evaporation of sulfite waste liquor is very difficult, particularly when a calcium bisulphite liquor is to be treated, since it tends to form deposits in the evaporator.


GENERAL OUTLINE OF PROCESS
STEAM STRIPPED WASTE LIQUOR FROM ACID SULFITE DIGESTION OF WOOD
ADSORPTION OF LIGNOSULFONATES ON ANION EXCHANGE RESIN
SUGARS Ca AND UNADSORBED LIGNOSULFONATES
ALKALINE SOLUTION
REGENERATION OF ANION EXCHANGE RESIN
ALKALINE SOLUTION OF LIGNOSULFONATES
Fig. 2

Useful products from sulfite waste liquor

U.S. 2,710,254 and 2,710,255, issued June 7, 1955, to Lloyd E. Van Blaircom and Kenneth R. Gray, assigned to Rayonier Inc. describes a process for the preparation of useful products from sulfite waste liquor by an ion-exchange process.

As shown in Fig. 2, steam-stripped waste liquor which is at a pH of about 4 is treated with an anion exchange resin which is free of primary and secondary amino groups and contains as exchange groups primarily tertiary amino groups. Lignosulfonate is thus adsorbed, the pH of the effluent rising as high as 9 to 11. The sugars and other undesirable nonionic organic constituents are not adsorbed and are thus separated in a single step from the adsorbed lignosulfonate.

The adsorbed lignosulfonate is eluted from the anion exchange resin by the use of an alkaline solution, e.g. sodium hydroxide, thereby regenerating the resin.

Production of sulfite cooking liquors

U.S. 2,736,635, issued Feb. 28, 1956, to Gerald Haywood and assigned to Ionics Inc., describes a process for producing sulfite cooking liquors by ion exchange.

An appropriate cation exchange resin in the sodium or ammonium form is contacted with sulfurous acid to bring about an exchange of hydrogen from the acid for sodium or ammonium from the resin, to produce sodium or ammonium sulfite or bisulfite.

Pulping wood with nitrogen oxides

U.S. 2,733,992, issued Feb. 7, 1956, to Lloyd H. Reyerson and assigned to Regents of the University of Minnesota, describes a process and apparatus for the pulping of wood, utilizing furnace gases containing oxides of nitrogen and nitric acid as the pulping agent.

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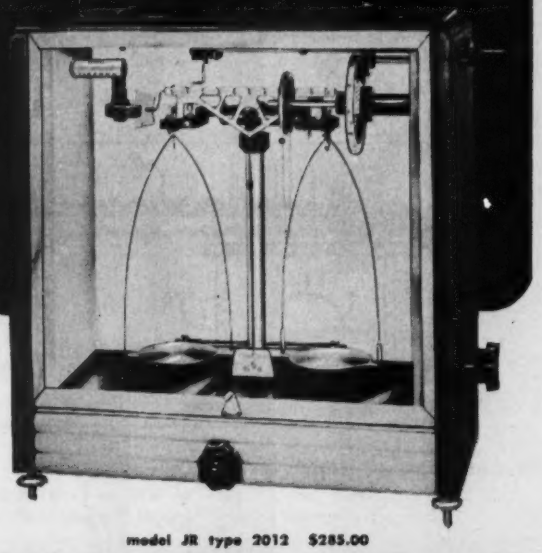

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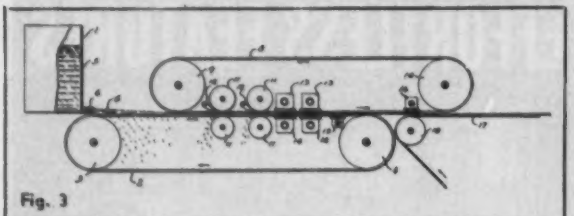


Fig. 3

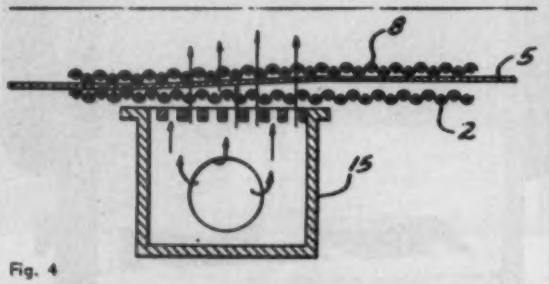


Fig. 4

Manufacture of paper

U.S. 2,730,933, issued Jan. 17, 1956, to William G. Reynolds, provides certain improvements in the process of forming sheets of paper.

As shown in Figs. 3 and 4, the headbox 1 contains the water-pulp mixture 5 which flows from the slice 6 onto the moving endless wire mesh belt 2 which is supported by the breast roll 3 and the couch roll 4. The hydrostatic head is so adjusted that the pulp-water mixture flows from the slice at a rate equal to the rate of movement of the wire. The water flows through the interstices of the wire leaving the pulp on the upper surface of the wire.

A second endless wire 8 supported by driven rolls 9 and 10 is mounted over the belt 2, so that its lower reach lightly contacts the upper surface of the pulp deposited on the wire 2. The wire 8 and its supporting roll 9 are located at such a distance from the head box 1 that sufficient time is permitted for free-draining water to pass through the wire 2 before the surface of the deposited pulp passes under the roll 9. The lower reach of the wire 8 also extends beyond the wire 2 in the direction of motion of the sheet.

The wire 8 moves at a speed exactly equal to the speed of wire 2, through synchronization of the rolls 9, 10 and 3, 4.

The wires 2 and 8 with the wet pulp between them pass between a number of rubber-covered pressure rolls 11, each of which presses part of the water out of the pulp, part of the water dropping through the screen. Water which is discharged upwardly tends to accumulate in front of each roll, and is removed by a suction manifold 12.

In order to remove water held within the pulp by capillary action, a number of air-blast manifolds or pressure boxes 13 are situated over the upper surface of wire 8. Jets of air pass down through the wet pulp into suction manifolds 14.

In order to remove the sheet from the wires, a pressure box 15 is provided below wire 2, through which jets of air are blown upwardly. The sheet is still attached to wire 8 but not to wire 2. It is then removed from wire 8 by means of another pressure box 16 above wire 8. The sheet of wet paper is blown onto surface of a wet press felt 17, whose speed is synchronized with that of wire 8.

Apparatus for interval feed and jet screening of stock

U.S. 2,730,932, issued Jan. 17, 1956, to John D. McCrystle and Edward F. Townsend, and assigned to The Sandy Hill Iron & Brass Works, describes an apparatus for screening papermaking stock.

Stock is fed and water is discharged simultaneously to a flat screen at intervals or spaced points along the screen plates. In this way, there are jets which sweep over across the face of all the plates, which permits the use of greater stock consistency than usual.

Treatment of waste ammonium sulfite pulping liquors

U. S. 2,739,039, issued March 20, 1956, to Maurice W. Phelps and assigned to Allied Chemical & Dye Corp., provides a method of treating waste ammonium sulfate pulping liquors.

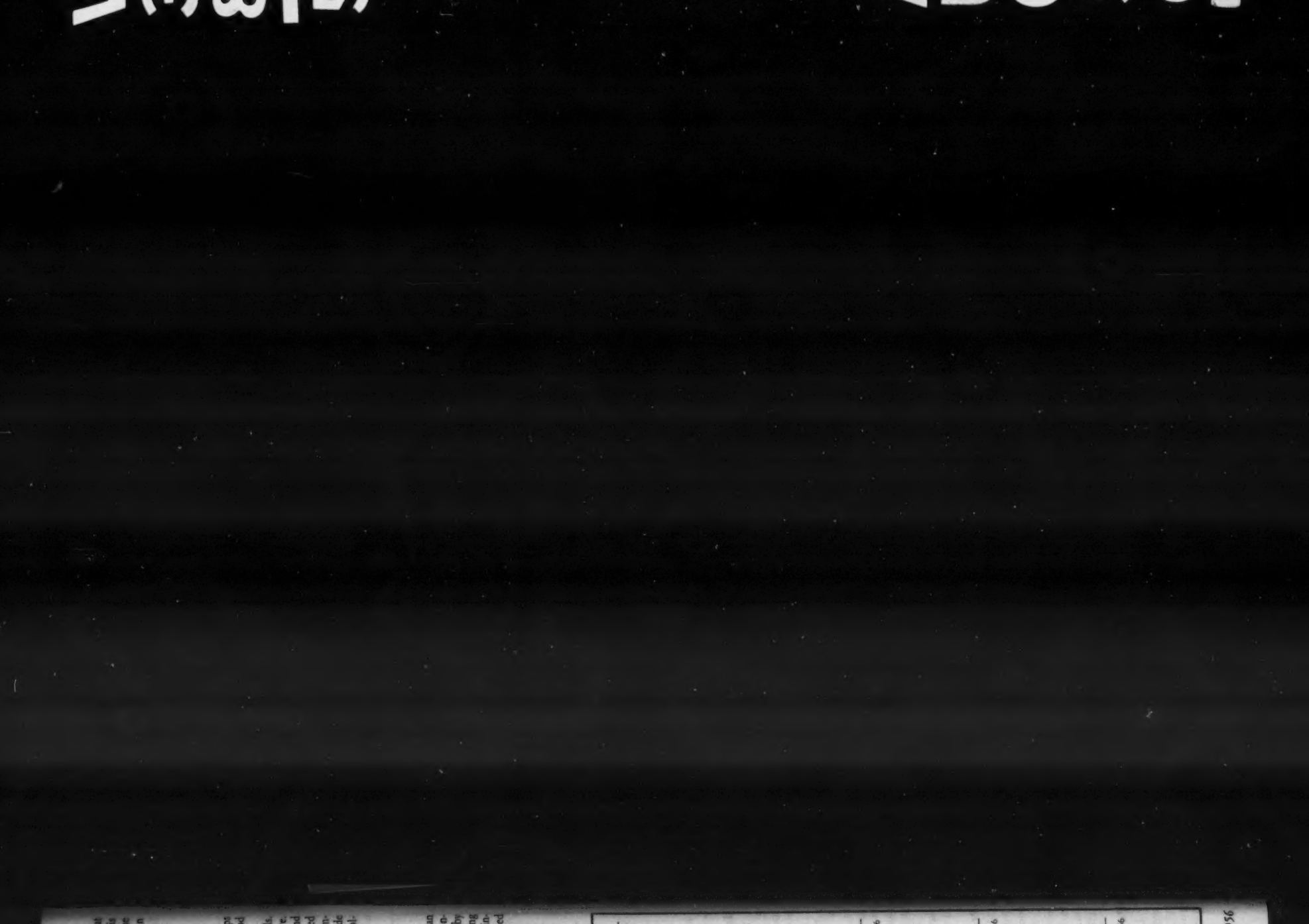
The liquor is concentrated to 50-80 per cent by weight solids. The concentrated liquors are dispersed in an oxidizing atmosphere. Here the liquor is heated to 600-1400°F., dehydrating it and partly decomposing the solids. The resulting partially decomposed solids pass to a combustion zone at 1500°F. The evolved ammonia does not seriously interfere with recovering sulfur dioxide substantially uncontaminated by sulfate, hydrogen sulfide, or colloidal sulfur.

Moisture control apparatus

U. S. 2,724,903, issued Nov. 29, 1955, to Henry O. Ehrisman and assigned to Foxboro Co., provides an apparatus used to control the moisture content of paper in papermaking machinery by controling the temperature of steam which is used as a heating medium to reduce the moisture content of the paper. The principal improvement is reduction of the amount of paper wasted after a break in the paper occurs.

Other Patents of Interest to the Pulp and Paper Industry

Subject	Inventor or Assignee	Patent No.	Date
Screen plate for papermaking machine	Frank Dustan	2,737,086	3/ 6/56
Headbox for paper machine	Canadian International Paper Co.	2,737,087	"
Papermaking machines	Millspaugh Ltd.	2,737,088	"
Apparatus for decurling a paper web	John R. Baumgartner	2,737,089 2,737,090	" "
Machine for forming closures on ends of fiber containers	American Can Co.	2,737,091	"
Method of making helically wound containers	Ernest B. Robinson	2,737,179	"
Air-laid absorbent fiber felt	Wood Conversion Co.		
Packing ring support	Precision Rubber Products Corp.	2,737,292 2,737,332	" "
One-piece paper container	Lily-Tulip Corp.		
Paperboard container	Oswego Falls Corp.	2,737,333	"
Multiple unit carton	Fiberboard Products Inc.	2,737,334	"
Unitary impervious container	George A. Moore	2,737,335	"
Container with hermetic closures	George A. Moore	2,737,336	"
Container and container blank assembly	George A. Moore	2,737,337	"
Resilient closure for containers	George A. Moore	2,737,338	"
Multiply bags	Arkell Safety Bag Co.	2,737,339	"
Sectional cardboard display device	Elnson-Freeman Co., Inc.	2,737,742	3/13/56
Vertical chamber positive pressure machine for forming continuous strips of fibrous material	Forming Machine Co. of America, Inc.	2,737,858	"
Shrinkable paper wrappers for filamentary packages	American Viscose Corp.	2,738,060	"
Filter of starch-resin impregnated webs of laminated creped paper	Kimberly-Clark Corp.	2,738,074	"
Guide for the wire screen of a papermaking machine	Karl A. Skardal	2,738,682	3/20/56
Cigarette paper	Ecusta Paper Corp.	2,738,791	"
Collapsible holders for containers	Sutherland Paper Co.	2,738,871	"
Fruit and vegetable container	Keyes Fibre Co.	2,738,914	"
Molded service tray	Continental Can Co., Inc.	2,738,915	"
Closures and seals for cartons	Thomas B. R. Peters	2,738,916	"
Container partition structure	Consolidated Water Power & Paper Co.	2,738,917	"
Method of sizing photographic paper	Eastman Kodak Co.	2,739,062	"
Molded pulp egg carton	Diamond Match Co.	2,739,750	3/27/56
Combination container	Charles W. Bailey	2,739,751	"
Container	Highland Container Co., Inc.	2,739,752	"
Egg case separator	Diamond Match Co.	2,739,753	"
Reinforced carrier receptacle	American Box Board Co.	2,739,754	"
Bag	Bemis Bros. Bag Co.	2,739,755	"



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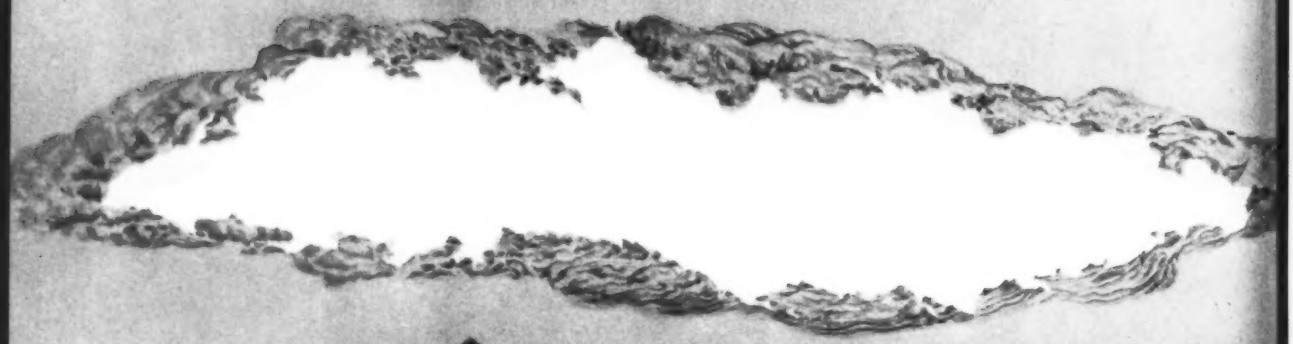

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2 No need to alternate with any other slimicides! SLIMODYN contains three powerful heavy metal toxicants for use in most white water systems. MICRODYN is specially formulated for application in paper mills where mercurials are objectionable. SLIMODYN and MICRODYN, being completely dispersible in water, are suitable for spraying after washups, and adsorb readily on surfaces to build a residual germicidal activity. They are relatively unaffected by changes in pH; will not shorten wire life or cause foaming.

For complete information, contact

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Wait!

NEW PRODUCTS

11/ Use readers' service card.

Centrifugal fan

A new line of centrifugal fans with Airfoil blading has been announced. This makes possible 92 per cent peak mechanical efficiency and 88 per cent static efficiency in the movement of air in high pressure air conditioning, industrial process ventilation and vehicular tunnel ventilation. The fans have a low operating cost since maximum horsepower is attained within the normal range of fan selection. They are designed for direct connection to conventional squirrel cage induction motors operated at standard motor speeds.

Sixteen models are offered with wheel diameters ranging from 27 to 108 in. *Westinghouse Electric Corp.*

12/ Use readers' service card.

Pug mill mixer

Designed for use with hot, cold, wet or dry mixes, the pug mill mixer has a variable-speed drive of 20-60 rpm, although other ratios are available. The combined torque applied to the mixer shafts at 20 rpm is 2,000 in.-pounds. Its 110v operation is controlled by push button, starting and stopping. The mixing chamber is liquid-tight and the drive mechanism thoroughly guarded. *Lindcraft Corp.*

13/ Use readers' service card.

Work bull

M-H-F work bull Model 202 with 9 cu. ft. loader and heavy-duty 185 backhoe can dig, load, grade, clear and backfill. In transit, both attachments retract close to the machine, giving the operator clear vision for safe travel. There are no road restrictions traveling between job sites. The backhoe is available with buckets in sizes from 12 to 36 in. Backhoe reach is 14 ft. 8 in., digging depth 13 ft., dumping height 10 ft. 2 in. *Massey-Harris-Ferguson Inc.*

These items are numbered for your convenience. Further information on the various products described may be requested at no obligation through our Readers' Service Dept. Use the business reply card in this issue.

14/ Use readers' service card.

New adhesive

Available for spray, brush or machine application, Tygobond requires only contact pressure, without heat curing, to produce a strong, durable bond that is resistant to water, acids, alkalies, oils and certain solvents. Tygobond may be applied, dried and stored, followed by reactivating the surfaces prior to assembly or closure. Test samples and complete information are available. *U.S. Stoneware.*

15/ Use readers' service card.

Heat transfer insert

This Gross-Dilts heat transfer insert, developed and patented by Gross, has been used in cooling rolls of Dilts polyethylene extrusion laminators, hot melt coaters and cooling trains built since 1951 and has proved itself in the field for high efficiency and maximum uniformity of temperature.

Gross-Dilts heat transfer insert rolls can also be employed as heating rolls using low-pressure steam, hot water or hot oil. *Black-Clawson Co.*

16/ Use readers' service card.

Motor

The new Line-o-motor combines the advantages of integral motor-reducer units with the versatility of separately mounted motors. It is available in horizontal models for foot mounting or in vertical and vertical extended housing models for flange mounting.

Line-o-motor capacity ranges from 1 to 75 hp. for any A.G.M.A. service classification. Double, triple or quadruple reductions provide a selection of ratios from 5.06:1 to 238:1. With Line-o-motor drives, smaller stocks of standard motors are practical, motor change is faster, and drive systems are more versatile. *Foote Bros.*

17/ Use readers' service card.

Polyethylene emulsion

Monapolene A is a stable anionic emulsion of polyethylene with a very small particle size. The unique emulsifying system of Monapolene A makes it possible to develop outstanding resistance to hot and cold water. Monapolene A supplements rosin size and alum, and it may be used as a wet end additive or applied as a surface treatment on the size press, calender box or sprays. *Mona Industries Inc.*

18/ Use readers' service card.

Flooring compound

Small ruts, holes or cracks in concrete floors can be filled and traffic resumed with a minimum of delay with the new, quick-setting, flooring compound known as Stonfil. Stonfil is double the strength of concrete in patches and is of concrete color. It can also be used in freezers or cold storage rooms at freezing temperatures. *Stonhard Co.*

19/ Use readers' service card.

Chipping machine

Experiments have shown that wood when chipped should never be crushed and its cellulose fibres should not be in-

New Products . . . . . .

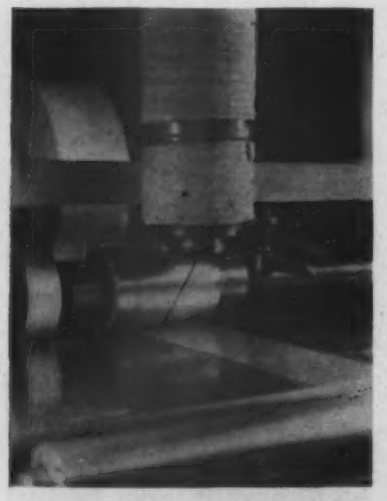
jured if top quality pulp is to result. A French woodworking machinery manufacturer has developed a chipping machine which cuts the wood parallel to the fibres, preserving them from damage. The machine, which is capable of producing economically uniform shavings of nearly any size and shape, from coarse chips to fine wood flour, is presently being introduced in the United States and Canada. *Guilliet Co.*

20/ Use readers' service card.

Tank repair compound

Metal tanks, pipes and conduit can now be mended without welding by using a newly developed epoxy resin material and glass cloth. The method is especially useful where flammable materials are being handled and complete evacuation of all liquids, gases or powders would be necessary before welding could be started.

The resin material has great chemical stability and good adhesion to metals; it is oil and waterproof, resists acids and alkalis, and will withstand temperatures to 200°F. Repair kits containing all needed materials, glass cloth, stirring paddles, brush cleaner and the compound are available. *Smooth-On Mfg. Co.*



21/ Use readers' service card.

Molten bead sealing

Now made possible by a new molten bead sealing principle, a continuous seal for polyethylene film produced at rates of 500 fpm. The new principle extrudes a hot filament of polyethylene between two layers of film at the point where they are to be sealed. The molten bead is fed between continuously moving lengths of film. Pressure to flatten out the molten bead between two films is applied to rollers through which the film passes after picking up the bead. The new technique may be used to seal polyethylene film and is applicable to the sealing of polyethylene coated paper, polyethylene laminates and paper. No equipment is yet commercially available for molten bead sealing. *Bakelite Co.*

22/ Use readers' service card.

Mixing machine

A unique feature of the mastigrator is the use of the interrupted screw system for mixing, and for developing forward pressure to carry the material through a selected extension head or orifice plate. Simple, rugged construction and ease of cleaning are additional design advantages.

Rietz mastigrators are now being tested on a multitude of products and the company offers to do preliminary laboratory test work at no charge on any application or problem that involves the possible use of the Rietz mastigrator. *Rietz Manufacturing Co.*

23/ Use readers' service card.

Knife grinder

A new knife grinder handles circular knives, either the shear-cut or score cut types, ranging in size from 2¼ to 9-in. diameter. A four-speed spindle drive permits instant speed changes, adapting the grinding speed to large mill type circular knives, faster for the 3-in. slitter wheels and a top speed of 4000 rpm for polishing. The grinder has automatic oscillation of the grinding wheel and is designed so that both planes of the included angle on score-cut wheels can be ground without removing the wheel from the grinder. This feature assures perfect centralization of the cutting edge. *Cameron Machine Co.*

24/ Use readers' service card.

Power loader

This new power loader fits any standard truck chassis and is operated from a power take-off through the engine transmission. The unit is hydraulically operated with a capacity of 4000 lb. The boom swings in a full 360° arc. The standard unit has a 12-ft. boom and hydraulic stabilizers for use in side loading. Several length booms and boom extensions are available.

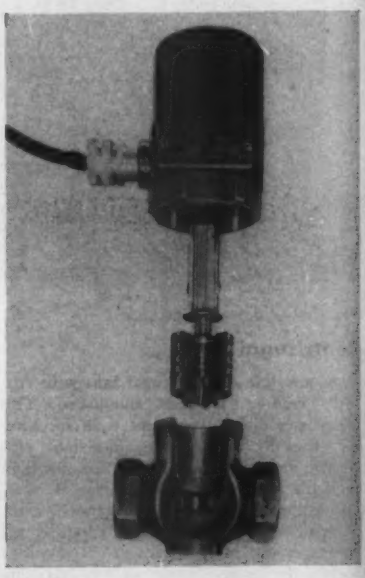
Products and materials such as logs, pipe, concrete blocks, brick, boxes and crates, sacks, barrels, poles, transformers, valves and steel are handled by one man with ease. The unit permits the use of standard grabs, hooks, slings, tongs, buckets, clams, etc., for loading and unloading. *L.A. Young Spring & Wire Corp.*

25/ Use readers' service card.

Non-contact weight gauges

A new series of beta radiation, non-contact weight gauges under the trade name of Atom-At has been announced for use in continuous measurement and production control of sheet paper and paperboard.

Five basic types of gauges are available for a wide range of materials and applications: the basic transmission gauge for paper, paperboard, and other sheet materials; the backscatter gauge to measure coatings such as paint, lacquer, adhesives, rubber and other moving sheet materials which are accessible from only one side; the differential gauge for measuring coatings on thin materials; the multiple head transmission gauge for greater widths of the same materials; the transverse profile portable gauge which measures thickness across the entire width of a sheet. By using foot-wide samples, the profiles of all the lines in a plant can be rapidly recorded with this single instrument. *Nuclear Corp. of America Inc.*



26/ Use readers' service card.

Solenoid valves

A main feature of these solenoid valves is a removable operating assembly to facilitate inspection and cleaning or complete replacement of operating parts without disturbing the electrical connection while the valve body remains in the pipe line. Complete interior valve units are available for quick, complete replacement of the operating mechanism so that down time is held to a minimum. *Magnatrol Valve Corp.*

27/ Use readers' service card.

Slide valve

Designed especially for use in pipelines transporting solid materials in liquids, this slide valve is employed to sectionalize branches of the piping system in order to direct the flow through a desired course.

Available in 6, 8 and 10-in. sizes for a maximum pressure of 125 psi, the valve provides straight-through flow in the open position with full pipe diameter. The slide

gate extends through the stuffing box in both ends of the valve body, avoiding the possibility of solids lodging around the slide gate and interfering with full opening and closing of the valve.

It is supplied for either manual or power operation. *Allen-Sherman-Hoff Co.*

28/ Use readers' service card.

Cart

This materials handling cart is suited for transporting small parts, chips, shavings, clippings, liquids and waste. Its overall height of 20 in. gives it clearance under work benches, hoppers feeders and machine tools. Its bin type design makes for easy loading and dumping.

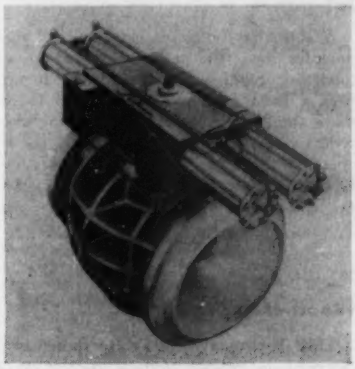
A short turning radius and low center of gravity improves maneuverability and improved handle design makes stooping unnecessary.

Capacity is 7 cu. ft. and weight is 95 lb. *Coolant Equipment Corp.*

29/ Use readers' service card.

Dragline truck

A dragline truck with all welded steel framework which will provide strength and durability. Replaceable hardwood deck is light in weight, provides long-lasting, nonslip cargo carrying surface. Platform sizes and load carrying capacities to meet any requirements. Standard deck heights range from 7½ in. to 14 in. Roller bearing wheels are optional. Wheels may be steel, plastic or rubber tired. Blackboard and bill holder are optional. *Howe Scale Co.*



30/ Use readers' service card.

Valve actuator

These new valve actuators are built to operate high-pressure plug and ball valves up to 36 in. in size. A unique four-cylinder design provides direct-acting, balanced torque to the valve stem. The use of cylinders offers the basic construction of simplicity and sturdiness, resulting in long and trouble-free life.

Gas and oil systems are entirely separate; there is no gas-oil interface. For testing, the detachable lever permits operation of acuator and controls without turning main valve. The actuators are available in a wide range of torque capacities, with a variety of control systems. *Ledeen Mfg. Co.*

31/ Use readers' service card.

Steel strapping dispenser

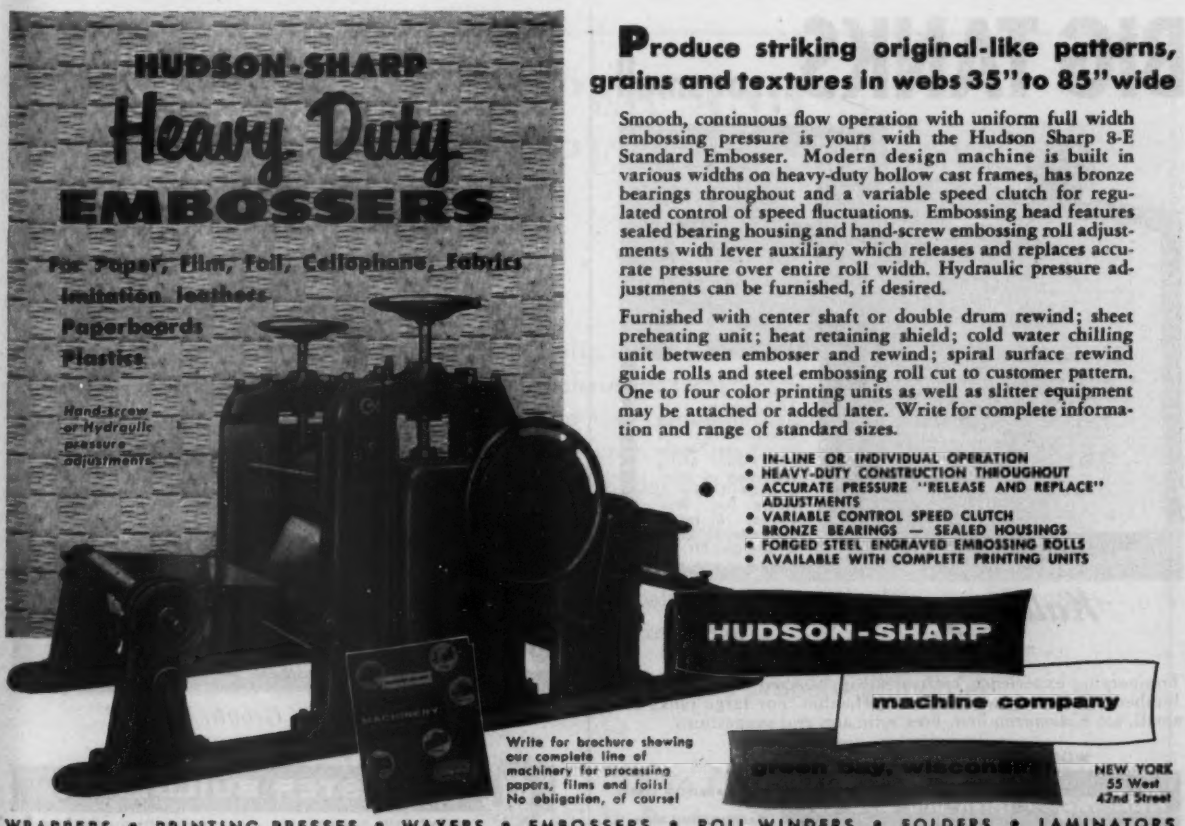
An electric power dispenser for cutting steel strapping to specified lengths. Known as Model E-5600, it can dispense strapping at the approximate rate of 250 fpm and can handle any size of heavy-duty strapping from ¾ in. × .028 to 2 in. × .050. It can be mounted on casters or installed permanently. The electric motor which powers the dispenser is equipped with magnetic brake. *Allegheny Steel Band Co.*

32/ Use readers' service card.

Leather belt cement

A new waterproof leather belt cement is said to dry in half the time formerly required with ordinary belt cements. Under normal conditions a double belt can be run within an hour after application.

Extra tackiness keeps belt laps in alignment while cementing. The cement will stick when leather is slightly moist or oily. Only one sizing coat is need. Constant flexing over pulleys will not weaken the lap. *J. E. Rhoads & Sons.*



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Furnished with center shaft or double drum rewind; sheet preheating unit; heat retaining shield; cold water chilling unit between embosser and rewind; spiral surface rewind guide rolls and steel embossing roll cut to customer pattern. One to four color printing units as well as slitter equipment may be attached or added later. Write for complete information and range of standard sizes.

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New Products . . .

33/ Use readers' service card.

Chlorinators

The first of two new V-notch chlorinators has been introduced. The line features a new metering and controlling principle, the V-notch variable-orifice.

Covering a feed range from 25 lb. per day to 2000 lb. per 24 hr., one model has direct reading dial indication of the feed rate with 14 per cent accuracy over a 20 to 1 range for any V-notch variable-orifice. The other model provides a rotameter for feed rate indication, giving accuracy over a 10 to 1 range for any one rotameter. *Wallace & Tiernan Inc.*

34/ Use readers' service card.

Panelboard

A new heavy-duty power distribution panelboard incorporating rigidly mounted fusible switch units of the quick-make, quick-break type. The new panel board is designed for 600-volt ac maximum service, 2- or 3-wire, single-phase, and 3- or 4-wire, three-phase, applications. Known as the Type QMR, it can be safely operated in systems having short-circuit capacities up to 100,000 amperes rms asymmetrical when current-limiting fuses are used. Units are horsepower rated for both standard and time delay fuses. *General Electric Co.*

35/ Use readers' service card.

Jet gun

A super-jet condenser cleaning tool that provides fast and effective cleaning of condenser tubes is now available. It utilizes a handy gun-and-slug method to remove slime and scale at a time saving over ordinary mechanical methods. It can be operated by either air or water pressure. Effective pressures range from 50 to 200 psi. *Crane Packing Co.*

36/ Use readers' service card.

Wood-chip feeder

This horizontal wood-chip feeder was designed to replace vertical feeders in a positive pressure pneumatic conveying system and will handle up to 40 cords per hour of either soft or hard wood chips. It is "horizontal" by virture of the rotor drive shaft being mounted in a horizontal position. The chips enter the feeder by gravity and through the feeder enter the conveying system and are carried either to a silo for storage or to a chip loft for processing.

The body in cast iron; the rotor is of cast steel with 4 blades and is driven 13 rpm by a 7½ hp gear motor. *Fuller Co.*

37/ Use readers' service card.

Hydraulic circuit tester

Trouble can be quickly located and the efficiency of a hydraulic system checked by means of a new portable hydraulic circuit tester. Model PT-50-B circuit tester weighs 19 lb. and is handily contained in a reinforced case with carrying handle. Having a pressure range of 300 to 2000 psi, a maximum flow of 50 gpm and a temperature gauge reading from 60 to 220° F., the tester simultaneously measures temperature, pressure and flow from any component port in a hydraulic system. *Schroeder Bros. Co.*

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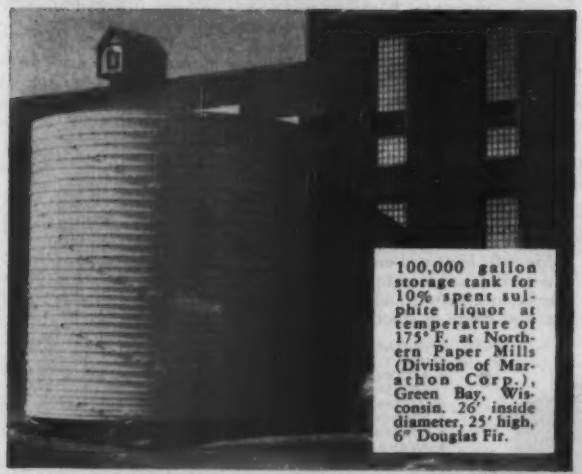

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NEW LITERATURE

Books

AN ENCYCLOPEDIA OF THE CHEMICAL PROCESS INDUSTRIES. By Jeffrey R. Stewart, F.A.I.C. Chemical Publishing Co. Inc., 212 Fifth Ave., New York 10, N.Y. 5⅞ x 8¾. 820 pages. $12.00.

It treats the practical aspects: raw materials, processes, equipment and finished products of the chemical process industries in an encyclopedic form. It also lists definitions of technical and scientific terms which are frequently encountered in these industries.

It should prove a treasury of information —collected for the first time in one handy volume—to all those who are actively engaged in the chemical process industries, whether they handle research, production, control, purchasing or sales.

As it lists the manufacturers and uses of thousands of trade-name and trade-marked products, it should also serve as a buyers' guide to chemists and consumers.

This encyclopedia will be equally useful to beginners and students who plan to enter the field of chemical process industries.

Manufacturers' Publications

These items are numbered for your convenience. Copies of the publications may be requested at no obligation through our Readers' Service Dept. Use the handy business reply card which accompanies this issue.

38/ Use readers' service card.

System Engineered Equipment for Industrial Plants. General Electric Co. This 48-page bulletin gives information on distribution system planning, features, advantages, application, operation and other data on system-engineered equipment for industrial power distribution.

39/ Use readers' service card.

Rubber Roll Coverings. Rodney Hunt Machine Co. This engineering report discusses the problem of how thick a rubber roll covering should be and is intended to assist in the design and selection of rolls for specific plant applications.

40/ Use readers' service card.

Floor Plate. Acme Steel Co. A folder which describes a floor surfacing armor which will add substantially to the life of heavy-traffic industrial cement floors. Floor Plate consists of square plates of hot, rolled steel specially designed for the reinforcement and protection of concrete floor surfaces.

41/ Use readers' service card.

Synchronous Motors. Allis-Chalmers. A bulletin featuring the construction of the large, end-shield bearing, synchronous motors. The motors meet the growing demand for a high degree of protection, combined with maximum accessibility for a variety of direct-connected or geared applications to drives for centrifugal blowers, compressors, fans, etc.

42/ Use readers' service card.

Texrope. Allis-Chalmers Mfg. Co. A leaflet describing the advantages of Texrope drive applications in the wood room, digester house and wet room, groundwood department, bleach plant, and in refining and papermaking, and chemical preparation and recovery.

43/ Use readers' service card.

Carbon Steel Tubing. Babcock & Wilcox Co. This folder furnishes condensed data on the mechanical and physical properties of seamless and welded carbon steel pressure tubing; also supplies helpful information on the various fabricating operations normally performed on such tubing.

44/ Use readers' service card.

Cutter-Creaser Equipment. Champlain Co. A complete description of roll-fed cutter-creaser equipment, including detailed operating instructions and descriptions of all components, is included in a new 44-page book. The book contains 29 photographs and drawings of complete presses as well as individual components. Typical die layouts, examples of properly cut and creased cartons and change gear specification tables are included.

45/ Use readers' service card.

Wound Rotor Motor. Allis-Chalmers Mfg. Co. A bulletin describing the construction features of wound rotor motors. Allis-Charmers wound rotor motors are being used for driving fans, blowers, hoists, lifts, cranes, machine tools, presses, conveyors and similar applications.

46/ Use readers' service card.

Solve Big Building Problems. Armco Drainage & Metal Products Inc. A 6-page booklet tells how to solve big building problems on rigid frame-type steel buildings—from 1600 sq. ft. Descriptions and specifications are given, and the folder is well illustrated with drawings and photographs.

47/ Use readers' service card.

Roller Chain. Link-Belt Co. A book containing 148 pages of information on one of the most complete lines of roller chain made. Included are sections on stock drives, installation and maintenance, lubrication, conveyor chains, casings and other such subjects.

48/ Use readers' service card.

Speedomax G. Leeds & Northrup Co. Concise information about Speedomax G recorders for precise measurements of rotational and linear speeds, and about the tachometer generators used with them, is available in an illustrated 4-page data sheet. The sheet lists the features

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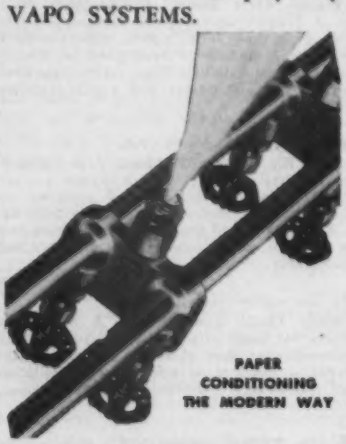

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New Literature . . .

and specifications of both round and strip-chart recorders and tabulates the characteristics and speed ranges of both standard and explosion resistant tachometers.

49/ Use readers' service card.

How To Stack and Load Corrugated Boxes. Hinde & Dauch. Copy and detailed illustrations in this booklet describe effective methods of estimating storage space, distributing load weights, handling, identification, and the use of gates, bulkheads, barricades and weather-stripping. It also gives nine basic rules for efficient stacking and loading.

50/ Use readers' service card.

31 Emerson Jordan. Emerson Manufacturing Co. A bulletin covering extensive design improvements and all other data on the company's Series 31 Emerson jordan. A chart is included showing relative stock capacities, speed and power ranges. All important construction features, parts and dimensions are identified and fully illustrated by protographs and drawings.

51/ Use readers' service card.

Heat and Corrosion Resisting Castings. Michigan-Standard Alloy Casting Co. A 16-page illustrated manual on heat and corrosion resisting castings. Use of this manual can be of value in determining the type of heat and corrosion resisting metals to be considered when selecting castings for industrial applications which are subject to high temperatures or chemical corrosion.

52/ Use readers' service card.

Two Wall Charts. Olin Mathieson Chemical Corp. Two illustrated wall charts, presenting instructions for the safe handling of chlorine and caustic soda, have been prepared for the users and handlers of these chemicals. The safety charts give the Do's and Don'ts on handling these chemicals.

53/ Use readers' service card.

Close-cupld Centrifugal pumps. Goulds Pumps Inc. A bulletin describing construction features, performance data and pump specifications of a line of close-cupld centrifugal pumps. These close-cupld pumps are widely adaptable to paper mills, oil refineries, chemical plants and industry generally.

54/ Use readers' service card.

Roll Handling. Lewis-Shepard. Analysis on paper roll-handling. Roll-handling methods and equipment—ranging from heavy-duty electric fork trucks equipped with clamps and attachments to two-wheel hand trucks—are described in detail in various installations throughout the country.

USDA Reports

FINANCIAL ASPECTS OF PRUNING PLANTED SLASH PINE. (Station Paper No. 64.) By Frank A. Bennett. Published by Southeastern Forest Experiment Station, Asheville, N. C. 8 x 10½. 9 pages. In anticipation of increased interest in the profitability of pruning slash pine, following on the recent surge in planting of southern pines, this paper presents some costs and return figures.

HIGH-YIELD NEUTRAL SULFITE PULPS. (Report No. 2053). Issued by U. S. Forest Products Laboratory, Madison 5, Wis. Presented here are the results of research on neutral sulfite pulps obtained from aspen, white oak and jack pine in yields that ranged from 50 to 75 per cent.

PUBLICATION ON FOREST GENETICS. (Station Paper No. 63.) Compiled by Keith W. Dorman. Published by Southeastern Forest Experiment Station, Asheville, N. C. 8 x 10½. 17 pages. This list covers publications in the field of forest genetics and related subjects from 1939 through 1955 with short abstracts of each.

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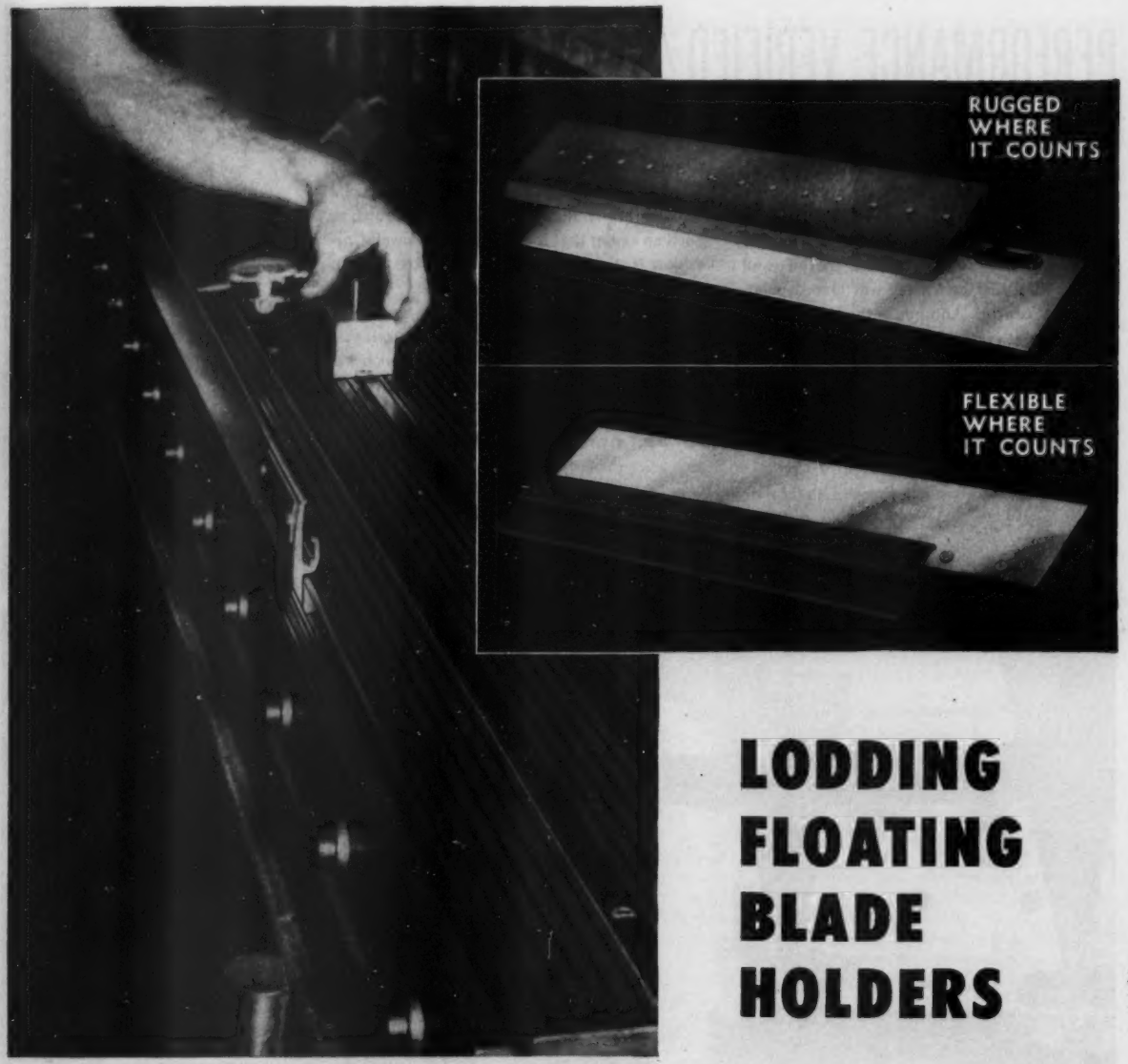

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FIG. 1503 SS (Sectional)—150-Pound Alloy Steel Gate Valve.

FIG. 3065 SS (Sectional)—300-Pound Bolted Cap Alloy Steel Horizontal Lift Check Valve.

FIG. 1333 A (Sectional)—Integral Bonnet Angle Valve For Pressures of 1500 and 2500 W.S.P.

POWELL VALVES

BRONZE, IRON, STEEL AND CORROSION RESISTANT VALVES.

FOREIGN ABSTRACTS

The scanning electron microscope as a tool in fiber technology

Injured fibers, such as those occuring in mechanical pulps, present difficulties to the microscoptist. However with the development of the scanning electron microscope, the examination of such fibers *in situ* can be made up to a resolution of 250 Angstrom units and at a high depth of field. Sectioning or replication of the specimen is not required.

The authors also give a short critical survey of other techniques now in use, and indicate the type of supplementary information obtainable by means of the new scanning electron microscope. Twenty one figures and 18 references are included. D. Atack and K. C. A. Smith *Pulp and Paper Magazine of Canada* 57, 243-51 (Convention issue, 1956) (through *Bull. Inst. Paper Chem.* 26, No 8, 644 (1956)).

Hardboards from tropical timbers; African pencil cedar

Boards that met the British standard requirements for "super" hardboards were made experimentally from mature heartwood and from young sapwood of African pencil cedar (*Juniperus procera,* Hochst.). The process involved simple steaming of the chipped wood, followed by defibration and refining in a disk mill to produce the pulp, which was then hotpressed by the usual procedure. Boards made from the heartwood were especially satisfactory in their water resistance, but those from the sapwood required further treatment such as tempering, to reduce their absorptivity to the required level. Presumably boards required no heat tempering or other treatment could be made from suitable mixtures of heartwood and sapwood, provided at least 50 per cent of the former were present.

Good board was also made from heartwood from which nearly all the natural oil had been removed by ether extraction, and such board met the requirments without any further treatment (such as sizing). Heartwood boards either unextracted or unextracted with ether) were very resistant to fungal decay under standard testing conditions, but boards made from the sapwood were greatly attacked. Unextracted heartwood also showed high resistance to the attack of 2 types of wood-destroying termites. When the wood was pre-extracted it was less immune to such attack, but it was still far superior to boards made from sapwood.

The results of the study indicate that it should be possible to recover the cedar oil (which has a commercial value) by means of solvent extraction or steam distillation, and then use the residual wood for super hardboard manufacture, inasmuch as this board has high strength properties, dimensional stability, and durability under tropical conditions. D. F. Packman. *Colonial Plant and Animal Products* (London) 5, No 2, 137-49 (1955) (through *Bull Inst. Paper Chem.* 26,621 (1956).

Factors that influence the permanence of paper

The effect of sizing agents, in many instances, is to hasten the aging processes in paper, as shown by physical testing data and by changes in pH. When melamine resin was used as the sizing agent, the sheet retained its normal physical properties with the exception of folding endurance. On the other hand, rosin size, chloroparaffin, and protein sizes used in conjunction with Bewoid size caused sheet deterioration.

Artificial aging had an especially harmful effect on the folding endurance. After 20 hours of irradiation, the paper became brittle. Depending on the type of size used, the folding endurance was affected to a greater or lesser degree. The action of "unsaponifiable" size appeared to be more harmful than did the action of saponified material. Fillers, as exemplifid by 20-30 per cent kaolin, had no appreciable effect on sheet deterioration. Rag stock in paper improved its permanence.

The authors point out that the factors studied are of importance to paper technology whenever high quality papers are exposed to light and air. K. Sumionesku, E. Poppel, and N. Asandej. *Bumazh. Prom.* (*Paper Ind. U.S.S.R.*) 1955, No 11 (Original in Russian). through *Wochbl. Papierfabr.* 84,229 (1956) (Abstract in German).

The influence of speed on determination of paper strength

The breaking length of various paper samples was determined both in the machine and cross-machine directions, using an instrument that could operate at various speeds, the extremes being 28 mm. and 125 mm. per minute. Testing was carried out at the slow and the fast rates, and the average ratio of these instrumental speeds was about 4.29. The ratio of the breaking length (times 100) made by the rapid determination to that made in the slow-speed determination varied from 101.2 to 116.3, depending on the sample tested. The average ratio was 107.6 Evidently the speed of operation is significant. Data are given resulting from 50 determinations made on each sample.

Although there was no apparent or consistent relationship between elongation and the speed at which the determination was made, marked differences were noted in all but one case. These were either positive or negative with repect to the normal testing procedure.

Bursting pressure tests were also made with a wide variety of both commercial and laboratory samples, and here 60 determination were carried out on each specimen. In the bursting tests, the speeds were also varied, the ratio of operating periods being 2.5 to 3.5. In the case of the laboratory samples, the basis weights (from a specific pulp stock) were varied, often between 30 g. per sq. meter and 180-200 g. per sq. meter.

The basis weights of the commercial paper samples varied from 33 to 699 g. per sq. meter. The ratio of the bursting pressures (times 100) made at slow speed to the corresponding ones made at high speed varied from 112 to 93, but there was a proximate relationship between this ratio and the actual bursting pressure (reported in grams per sq. meter). When the burst rose to about 2000, the ratio approximated 100. Much below 2000, the ratio was above 100, and much above 2000, the ratio fell below 100.

These figures were subject to certain fluctuations, and even when the burst was extremely high (*i.e.* 12000 to 14000), this ratio never fell below 93. *J. Francais, Assoc. tech. ind. papetiere, Bull.* 1956, 33-6 (in French).

Pulping mixed species of a mangrove association

The following hardwoods were studied chemically and morphologically: *Rhizophora apiculata* (*I*) (also termed *R. conjugata*), *Comptostemon schultzii* Mast. (*II*), *Sonneratia acida* L.f. (*III*), *Bruguiera gymnorrhiza* (L) Lamk. (*IV*), and an unidentified *Excoecaria* species (*V*). For purposes of comparison, a *Eucalyptus regnans* wood was also examined. Each wood of *I-V* was pulped individually by the sulfate process, and a series of mixed cooks was also made.

In one instance equal amounts of *I, II, III,* and *V* were mixed and cooked. Ordinarily the pulp yields approximated 50 per cent, and pulps made from the mixed species showed average strength properties.

The pulps made from individual woods showed marked differences from each other. For example, *I* and *IV*, which had thick cell walls, were less suited to individual pulping than were *II, III* and *V*, and (excepting for internal tear resistance) the pulps from the first two species were quite weak. *II* and *V* gave pulps that were high in burst and in tensile strength, but low in tear factor. The pulp from *III* was weaker

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Foreign Abstracts . . .

than that from *II* and *V*.

The chemical composition of the woods (as a group) was not too different from that of the hardwoods of the temperate zones, except for the ash content which was higher (1.4 to 2.9 per cent) and the pentosan content which was lower (in the range of 13.2 to 18.1 per cent).

This report is from the Division of Forest Products, C.S.I.R.O, Melbourne, Australia. A. V. Koeppen and W. E. Cohen, *Holzforschung*, 10, 18-22 (1956) (in English).

Higher terpenes as by-products in kraft pulping

In an orienting study of by-products obtained in the distillation of sulfate turpentine and of tall oil, it was shown that the still residue from the turpentine distillation contained cadinene (and possibly a mixture of sesquiterpenes). This cadinene fraction was quite large and contained what may be a sesquiterpene alcohol (Possibly cadinol).

In distilling the tall oil, neutral substance from the first runnings (the so-called "chill mold oil") contained a diterpene (or possibly two); cadinene was apparently also present. The oil which was separated from the diffuser condensate contained more of the fraction boiling above 225° C. (at ordinary pressure) than did the raw turpentine from the digester. Hilding Bergstrom. *Svensk Paperstidn.* 59,141-2 (1956) summary).

Chemigroundwood from hardwoods and from softwoods

These are two papers from the Technische Hochschule at Darmstadt. Spruce, pine, beech, birch and aspen woods were pretreated chemically in a variety of ways, and were then ground. The resulting pulps were compared with an untreated standard mechanical pulp. In the case of the conifers, ten different chemical pre-treatments were used; five were used in the case of the hardwoods. These are all described in some detail.

Among these treatments were the mild sodium bisulfite digestion advocated by Weisshuhn, and the fairly drastic, but very effective sodium sulfitesodium bicarbonate pretreatment devised by Libby and O'Neil. Each of these receive special attention at the hands of the present authors. In all cases, the effects of the pretreatments on the yield, power consumption, fiber fractionation, tear resistance, folding endurance, breaking length, initial wet strength, and bleachability of the various pulps were studied.

The Libby-O'Neil process showed advantages in the case of aspen, which was superior to similarly prepared coniferous chemigroundwoods. The aspen pulps gave strong sheets, with fairly high breaking lengths, and a higher folding endurance at 20° S.R. than at 50° S.R. The differences

in properties between the variously treated chemigroundwoods and untreated groundwood are given. In the second paper, the authors studied the properties of spruce and aspen chemigroundwood (Made by the Libby-O'Neil process), and of a spruce chemigroundwood made by a mild sodium sulfite process, both in the beaten and the unbeaten states. These properties were then compared with those of other halfstuffs, and with those of normal and steamed groundwood and of unbleached sulfite pulp. Ordinarily the data include yield, brightness, freeness, bulk, initial tear, folding endurance, breaking length, burst, and initial wet strength. The chemigroundwoods are considered special types of halfstuffs, presumably intermediate between normal mechanical pulp and unbleached chemical pulps. Their strength properties are improved on beating. Walter Brecht and Sepo Pulst. *Das Papier* 9,551-62 (1955) 10,12-16 (1956).

Digesters with acid-proof brick linings

The author outlines instructions that should be followed in designing and in starting operations when dealing with digesters lined with acid-proof brick. The initial tension between the steel body of the digester and the layer of brick, is a basic condition affecting the permanence of the brick lining and the safety and life of the steel shell. The author indicates to what extent this tension may be taken into consideration at the time that the steel digester is being constructed, and also when the finished digester is first put into operation.

Six references and 8 figures are included. Rudolf Haas. *Das Papier* 10, 201-5 (1956) (in German).

Fiberboards as possible building materials

Testing of fiberboard sheets over long periods was carried out by placing the test samples under varying weights and noting the time required for rupture. The rupture stress decreased approximately linearly with the logarithm of the time.

The author concludes that, in planning building construction in which fiberboard is to be used, classical methods of strength testing are of doubtful value.

Seven references and 8 graphs. S.Ake Lundgren. *Svensk Pappers-tidn.* 59,329-34 (1956) (in Swedish, with brief English and German summaries).

Long term corrosion tests

Metal test plates were covered with a high grade stainless steel (Remanite 1880 SS), with the seams suitably welded. These specimens were hung into various operating sulfite digesters, and subjected to the effects of about 1000 sulfite cooks over a five year period. After each 50th digestion, the test specimens were withdrawn and weighed, and at the end of the entire experiment, they were examined thoroughly for pitting loss in thickness, etc.

The author makes no claim that this gives the last word on durability of stainless-steel lined digesters, but the tests yielded important information both on the steel and the welded joints. Surprisingly high resistance was shown by the test specimens despite the fact that the steel was low in molybdenum. Normally protected welded joints proved satisfactory, but it was evident that welded areas required protection against deterioration by the action of the other metal in the test sheet. Pitting resulted when the liquor contained hydrochloric acid; cooking liquors should be free from chlorides, and the author recommends that chips made from logs immersed in salt water should not be used.

Similar experiments were carried out simultaneously in five different pulp mills, and whereas the quantitative results (loss in weight and in thickness) were often quite different, the trends are similar. When the test specimen was immersed in the liquor during the cook, it lost much more and was much more drastically attacked than when it was simply suspended in vapor about the liquor.

The results are discussed at length, with a graph and suitable half-tones. Rudolf Haas. *Das Papier* 10, 283-43 (1956) (in German).

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MARKET QUOTATIONS

RAGS (Domestic)

New Cotton Cuttings

The following are brokers' and large dealers' average buying prices for sizeable lots in cents per pound f.o.b. New York:

	per cwt.	
No. 1 white shirt cuttings	13.50—	14.00
Soft unbleached muslins	15.50—	16.00
Fancy shirt cuttings	4.50—	5.00
No. 1 percales	5.50—	6.00
No. 1 washables	2.25—	2.35
No. 1 light silesias	6.50—	7.00
No. 1 light prints	4.75—	5.00
Light flannelettes	6.50—	7.00
Cottonades	3.00—	3.50
Blue overall cuttings	7.00—	7.50
Blue cheviots	7.00—	7.50
Canton flannels, bleached	10.50—	11.00
Canton flannels, unbleached	10.50—	11.00
Osnaburg cuttings	9.50—	10.50
Underwear cuts, bleached	14.50—	15.00
Underwear cuts, unbleached	14.50—	15.00
Sun tan khaki cuttings	5.25—	5.75
American linen cuttings	6.75—	7.25

Cotton Rags

The following are prices, cents per pound, paid by dealers and brokers f.o.b. New York:

	per cwt.	
No. 1 roofing (Chicago)	1.20—	1.25
No. 2 roofing (Chicago)	.80—	.85
Twos and blues, repacked	2.00—	2.25
Thirds and blues, repacked		
No. 1 whites, repacked		
No. 1 whites, miscellaneous		
No. 2 whites, repacked		
No. 2 whites, miscellaneous		

RAGS (Foreign)

(ex dock New York City)

New Rags

per cwt.

Nominal:
- New dark cuttings
- New mixed cuttings
- New light silesias
- Light flannelettes
- Unbleached cuttings
- New white cuttings
- New light oxfords
- New light prints

Old Rags

per cwt.

Nominal:
- No. 1 white linens
- No. 2 white linens
- No. 3 white linens
- No. 4 white linens
- No. 1 white cottons
- No. 2 white cottons
- No. 3 white cottons
- No. 4 white cottons
- Extra light prints
- Ordinary light prints
- Medium light prints
- Dutch blue cottons
- French blue cottons
- French blue linens
- Checks and blues
- Linsey garments
- Dark cottons
- Old shopperies

ROPE and BAGGING

F.o.b. and ex dock New York City

Gunny No. 1, domestic	4.75—	5.25
Gunny No. 1, foreign	4.75—	5.25
No. 1 manila rope, domestic	7.25—	8.25
No. 1 manila rope, foreign	6.25—	6.50
New burlap cuts	5.50—	6.00
Sisal strings	4.25—	4.50
Mixed strings	1.50—	1.75

WASTE PAPER

The following are prices, dollars per net ton, paid by brokers and large dealers for carload quantities of baled stock, f.o.b. cars New York:

No. 1 hard white envelope cuttings	105.00—	115.00
No. 1 hard white shavings	85.00—	90.00
No. 1 soft white shavings	55.00—	60.00
Soft white shavings, uncoated	60.00—	70.00
Fly leaf shavings No. 1	28.00—	33.00
Fly leaf, woody, No. 1	35.00—	40.00
Mixed colored shavings	18.00—	23.00
No. 1 books and magazines	21.00—	22.00
Ledger stock, white, No. 1	50.00—	55.00
Ledger stock, colored, No. 1 (Midwest ship)	35.00—	40.00
New manila envelope cuttings (free of groundwood)	75.00—	80.00
New manila envelope cuttings (containing groundwood)	55.00—	60.00
Manila tab cards	75.00—	80.00
Colored tab cards	50.00—	60.00
New all-kraft envelope cuttings	70.00—	75.00
Triple sorted kraft, 100%	35.00—	40.00
No. 1 old kraft	30.00—	
White news cuts, No. 1	75.00—	80.00
No. 1 overissue news	20.00—	21.00
Folded news, special	18.00—	19.00
Folded news, ordinary	15.00—	16.00
Old corrugated boxes	23.00—	
New jute corrugated cuts	27.00—	28.00
Mill wrappers	20.00—	22.00
Boxboard cuttings	10.00—	
No. 1 mixed paper	11.00—	13.00

CHEMICALS

F.o.b. New York City

Alum, ammonium		
Granular, bags, works, cwt.	4.30—	
Lump, drums, works, cwt	5.05—	
Powdered, drums, works, cwt	5.20—	
1-Arginine, drums, kilo	74.80—	
Blanc Fixe		
Direct process, bags, c.l., works, ton	110.00—	
L. c. l., works, ton	120.00—	
Bleaching Powder, drums, cwt		
Casein, domestic acid precipitated		
Standard, bags, 10,000-lb. lots or more, shipping point, lb	.32—	Nom.
Premium, bags, 10,000-lb. lots or more, shipping point, lb.	.38—	Nom.
China Clay, domestic dry-ground, airfloat, 99%		
325-mesh, bags, c. l., works, ton	10.00—	
300-mesh, bags, c. l., works, ton	13.50—	14.50
Imported, white, lump, bulk, c. l., ex dock Phila, Portland, Me., ton	20.00—	35.00
Chlorine, liquid		
Tanks, single units, works, freight equaled, cwt	3.05—	
Glycerine, refined (CP, USP) 99%, drums, c. l., lb	.31½—	
Litharge, commercial powdered		
Barrels, c. l., works, freight equaled, lb.	.18	—
Rosin, gum, c. l., f.o.b. New York, cwt		
E	9.05—	
F	9.05—	
G	9.05—	
WW	9.20—	
Rosin, wood, c. l., f.o.b., shipping point, cwt.		
K, M	7.90—	
N	7.95—	
WG	8.00—	
WW	8.15—	
Saltcake, domestic, bulk Works, 100% Na_2SO_4 ton	20.00—	
Soda Ash		
Dense, 58%, paper bags, c. l. works, cwt	1.80—	
Light, 58%, paper bags, c. l. works, cwt	1.75—	
Soda, caustic		
Flake, 76%, drums, c. l. works, cwt.	4.50—	
Solid, 76%, drums, c. l. works, cwt.	4.10—	
Sodium Silicate		
40°Be, 1:3, 2, turbid, drums, c. l., works, cwt.	1.45—	
52°Be, turbid, 1:2, 4, drums, c. l., works, cwt.	2.45—	
Starch		
Pearl, 140-lb. bags, cwt.		
Pearl, barrels, cwt.		
Paper (Sq.), bags, cwt.		
Powdered, barrels, cwt.		
Sulfur, crude		
Bulk, c. l. mine, long ton	26.50—	
Talc		
Domestic, bags, c. l. works, ton	28.00—	39.50
Canadian, ground, bags, c. l. works, ton	20.00—	35.00
Titanium Dioxide		
Pigment, calcium-rutile base, regular, bags, c. l., lb.	.09¼—	
High-tinting, drums, c. l., lb.	.09	—
Zinc Oxide Pigment, American process		
Lead-free, bags, c. l., lb.	.14½—	
Leaded, 35%, bags, c. l., lb.	.15½—	

WOOD PULP

Quotations on domestic and Canadian pulp, dollars per short air-dry ton delivered consuming mills including basic allowances, follow:

Bleached sulfite, No. 1	150.00—	
Bleached sulfite, Canadian	150.00—	
Unbleached sulfite	130.00—	
Unbleached sulfite Canadian	130.00—	
Bleached soda	145.00—	
Bleached soda, Canadian	145.00—	
Kraft, bleached hardwood	150.00—	
Kraft, bleached	152.00—	155.00
Kraft, bleached southern	155.00—	
Kraft, bleached Canadian	155.00—	
Kraft, unbleached southern	117.50—	122.50
Kraft, unbleached Far West	125.00—	
Kraft, unbleached Canadian eastern	130.00—	
Kraft, unbleached Canadian western	120.00—	125.00
Kraft, semi-bleached southern	140.00—	
Sulfite screenings	72.50—	
Sulfate screenings	67.50—	
Groundwood, domestic	82.50—	90.00

Quotations on imported wood pulp, dollars per short air-dry ton on dock American Atlantic ports, follow:

Bleached sulfite, Swedish, freight allowed	150.00—	
Bleached sulfite, Norwegian	145.00—	
Bleached sulfite, Norwegian, del'd with limited freight allowance	145.00—	
Bleached sulfite, Finish, freight allowed	150.00—	
Unbleached sulfite, Swedish, freight allowed	130.00—	
Unbleached sulfite, Finnish, freight allowed	130.00—	
Kraft, unbleached, Swedish, freight allowed	125.00—	
Kraft, unbleached, Finnish, freight allowed	125.00—	
Kraft, bleached, Swedish, on dock	155.00—	
Kraft, bleached, Norwegian	155.00—	

PAPER

Quotations are mill quotations Chicago

Boards (prices per ton, delivered in Chicago, 10 tons or more):		
Plain chip	107.50	
News vat lined chip	110.00	
.009 chip, rolls	100.00	
Filled news	112.50	
Solid news	114.50	
White vat lined chip	144.50	
Chip tube and can stock	112.50	
Single manila lined chip	162.50	
Single jute lined chip	147.50	
Container, 42-lb.		
Kraft liner (per 1000 sq. ft.)	2.68	
White patent coated		
.020	175.00	
.018	177.50	
.016	182.50	
Book Paper (f.o.b. Chicago, c.l. cases per cwt):		
No. 1 enamels	19.80	
No. 2 enamels	18.80	
Machine-coated, 45- to 100-lb.	14.75—	18.40
60-lb. + uncoated offset, 25 × 38 (2000 lb.)	16.55	
"A" grade English finish untrimmed, 25 × 38 (2000 lb.)	15.65	
Rag Content Bond (white, 5000 to 10,000-lb. sub 20, ream sealed cartons):	per ton	
100% rag	63.20	
75% "	48.45	
50% "	36.95	
25% "	31.00	
Rag Content Ledger (white, 5000 to 100,000-lb., ream sealed cartons):		
100% rag	64.40	
75% "	49.60	
50% "	38.10	
25% "	32.20	
Sulfite Bond (white, 5000 to 10,000-lb. sub 20, ream sealed cartons):		
No. 1	21.85	
No. 2	21.15	
No. 4	19.75	
Sulfite Ledger (white, 5000 to 10,000-lb., ream sealed cartons):		
No. 1	23.10	
No. 2	22.35	
No. 4	20.95	
Newsprint (contract base price)	per ton	
Rolls, standard	131.00	
Rolls, spot	185.00—	220.00
Sheets	Standard differentials	
Tissues (carlots)	per ream	
White No. 1		
White No. 2		
Bleached anti-tarnish		
Colored		
Anti-tarnish kraft		
Manila		
Napkins, semi-crepe (12½ lb. to M shts) per case		
Napkins, full crepe and embossed (12½ lb. to M shts) per case		
Toilet, bleached (M shts) per case		
Toilet, unbleached (M shts) per case		
Wrappings (kraft, basis 50 lb. and heavier)	per cwt	
Standard wrapping	9.00	
Butchers, counter rolls	10.00	
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Shipping sack, mill rolls		
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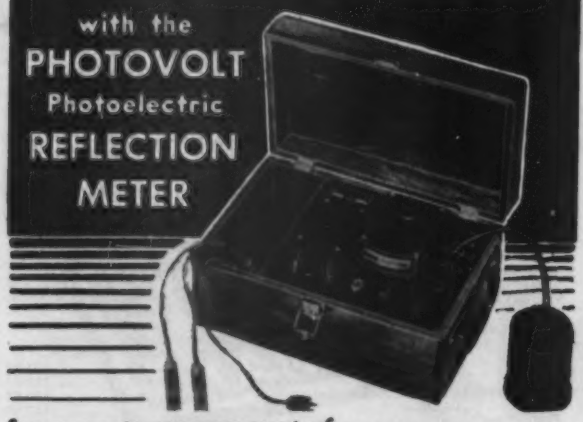

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of pulp and paper in terms of TAPPI specifications.
Also for *Gloss and Color*
tests on paper, cardboard, and other paper products.
Portable, reliable, rugged, simple to operate

Also: Colorimeters, pH Meters

PHOTOVOLT CORP.
95 MADISON AVENUE NEW YORK 16, N. Y.

New Aerovent "LS" Belt-Driven Fans, designed with new 4-blade "Macheta" Airfoil Propellers, provide high-volume air movement with slower motor speeds and lower horsepower requirements.

Available in sizes 24" to 48" for capacities to 31,800 CFM, they offer greater efficiency and economy against resistances to ⅝" SP than direct-driven types operated at identical horsepower ratings.

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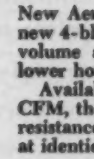

All Aerovent Fans are rated in accordance with the Standard Test Code and U.S.D.C. Comm. Std. CS178-51.

Aerovent Fan Company, Inc.
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CLASSIFIED ADVERTISING

MISSING PERSON

Anyone knowing the whereabouts of R. A. McDougall or family, formerly of Whiting Paper Co., please contact Realty Housing Co., 589 S. York, Elmhurst, Ill. Telephone: Terrace 2-8320.

PROJECT ENGINEER

Due to our expansion program, a permanent position for a graduate engineer with experience in the engineering aspects of the pulp and paper industry is available in large pulp and paper manufacturing plant in the Upper Midwest. Our employees know of this opening. Your confidential reply should include personal, educational, and work history together with salary thinking. Write Box 635, The Paper Industry.

Leather belt manufacturer wants mfr.'s agent established in pulp and paper industry to carry line. Most territories open. I. B. Williams & Sons, 180 N. Wacker Drive, Chicago 6, Ill.

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For paper and pulp mills and paper converting plants. Our service is rendered without charge to employees seeking executives. No fee to be paid by applicant until position is accepted. We will welcome an opportunity to be of service.

CHARLES P. RAYMOND SERVICE, INC.
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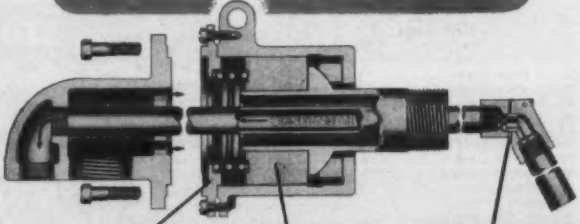
INDUSTRIAL ENGINEER WANTED

Graduate Industrial Engineer with practical experience in the paper industry. A knowledge of paper finishing is desirable. Should have ability in organization, expansion, mechanization and labor relations. Under 38 years of age, good salary and benefits. Fine opportunity for a man who is energetic and desires a challenge. Send detailed resume of experience and education to Personnel Manager, West Virginia Pulp and Paper Co., Luke, Maryland.

Johnson Joint

SELF-SUPPORTED TYPE
with SYPHON ELBOW



ASSEMBLY PLATE — Holds internal parts in position when head is removed.

SELF-SUPPORTING — Needs no external supports of any kind.

SYPHON ELBOW — Permits use of straight pipe for syphon. Can be inserted or withdrawn right through the joint.

WRITE FOR INFORMATION

Bulletin S-2001 has all the facts on this joint-and-elbow combination that supports itself, has no packing, needs no lubrication, outmodes unwieldy syphon pipes. Johnson Joints are also available in pipe-supported and rod-supported types, to suit all operating needs.

The Johnson Corporation
845 Wood St., Three Rivers, Mich.

PUT ACTION IN YOUR SAFETY PROGRAM

Add a touch of showmanship to your safety program. Films let you tell your training story with the dramatic impact of pictures . . . action . . . sound. You can cut your safety training in half, give fewer refresher courses and get better results by using training films.

Here are three film sets that will help you arouse and keep alive interest in your safety program. And there is no better way to teach foremen how to be better supervisors.

SPEAKING OF SAFETY

A brand new set of films that will teach your foremen and supervisors the tips they should know about making safety talks, and how to transmit management's ideas and plans. Six 35mm sound slidefilms and leader's manual in an attractive leatherette case.

HUMAN FACTORS IN SAFETY

This is a series of six 35mm sound slidefilms with leader's manual that may be used for an advanced safety course. Each film deals with one aspect of the complex art of handling people. Collectively, the films show how to train workers, how to keep experienced people on their toes and how to win respect, cooperation and loyal support.

SAFETY MANAGEMENT FOR FOREMEN

A set of ten 35mm sound slidefilms—all that is needed for a course in safety fundamentals. The films explain how to organize a safety program, what part the foreman plays in the program and how safety increases production. They also discuss specific safety activities, such as machine guarding, safety inspections, the first aid program, etc. Complete with leader's manual in an attractive leatherette case.

Write for complete information and details to the

NATIONAL SAFETY COUNCIL

425 North Michigan Ave., Chicago 11, Illinois

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New paper container for packaging of liquid products

A pyramid-shaped polyethylene and wax coated paper container, which has found wide acceptance in Sweden for packaging of such products as milk, cream, ice cream, fruit juices, soft drinks, honey, jam, jelly, salad dressing, etc., will be manufactured in this country by Crown Zellerbach Corp.

The new container, coated with wax on the outside and polyethylene on the inside, is formed and filled in one operation, thereby reducing packaging costs up to 50 per cent. The container enters the packaging machine as a vertical tube. It is heat-sealed at the base, filled with liquid, and then heat-sealed below liquid level at the top at right angles to the bottom seal. (See November, 1951 issue of The Paper Industry.)

The ready-to-sell packaged product then drops automatically into a box holding a number of these units for shipment.

It is envisaged that the new container will also find wide acceptance in the petroleum refining industry.

Pluronics in the paper industry

Pluronics, a new group of surfactant agents of high molecular weight produced by a condensation reaction of ethylene oxide with a hydrophobic material, show many outstanding properties of interest to the papermaker.

Thus, a member of this group with only slight hydroscopic properties appears to markedly increase the absorptive property of paper products, while at the same time imparting to paper a dry feel and softening it.

Pluronics are also used effectively in conjunction with sulfamic acid for the cleaning of machine felts.

Electrical elements in wallpaper

It is reported that experiments are being conducted in England with electrical elements embedded in wallpaper for the heating of homes and offices.

"Self-seal" used with glassine and greaseproof

A U. S. Envelope Co. developed self-seal emulsion, which seals only to itself by the application of pressure, finds new uses with glassine and greaseproof papers in the packaging field. Experiments are now being conducted in using "self-seal" treated glassine and greaseproof in food packaging, both for the packaging of powdered foods and large, bulky food products.

New deinking method

A deinked paper product, as good as that from virgin pulp and more economical, is claimed by Norman Hackerman and William Krodel, University of Texas, for their recently developed method. This method consists in shredding the waste paper, treating it in water with a detergent and salt, heating the mixture, and increasing the separation of ink and cellulose by means of an electric current.

Silicone rubber eliminates "pick-up"

A Union Carbide developed new silicone rubber that can be vulcanized in thick sections permits its use on rubber covered paper machine rolls. A press roll covered with silicone rubber at a Canadian mill showed absolutely no signs of sticking of the web to the roll, due to the water-repellent property of silicone rubber.

for Improved Retention!

If the advantages of using DARLING'S GLUE for improving retention haven't as yet gained *your* attention, we believe you'll find them well worth considering. The benefits derived from using a DARLING GLUE solution as a wet end additive vary with mill conditions. Generally speaking, here is what to expect—

—a significant increase in percentage of filler retained
—a more uniform sheet . . . in terms of opacity, basis weight and ash content
—a reduced load to the saveall

We'd like to work with you in determining what can be accomplished in your mill. The cost is on us, so you've nothing to lose . . . plenty to gain. You can make arrangements through your DARLING sales representative. Or write or call us direct.

• IF YOU ARE NOW USING GLUE . . . one of DARLING'S specifically-formulated glues should enable you to *save money* while maintaining or improving retention efficiency.

DARLING'S
improved BONE GLUE

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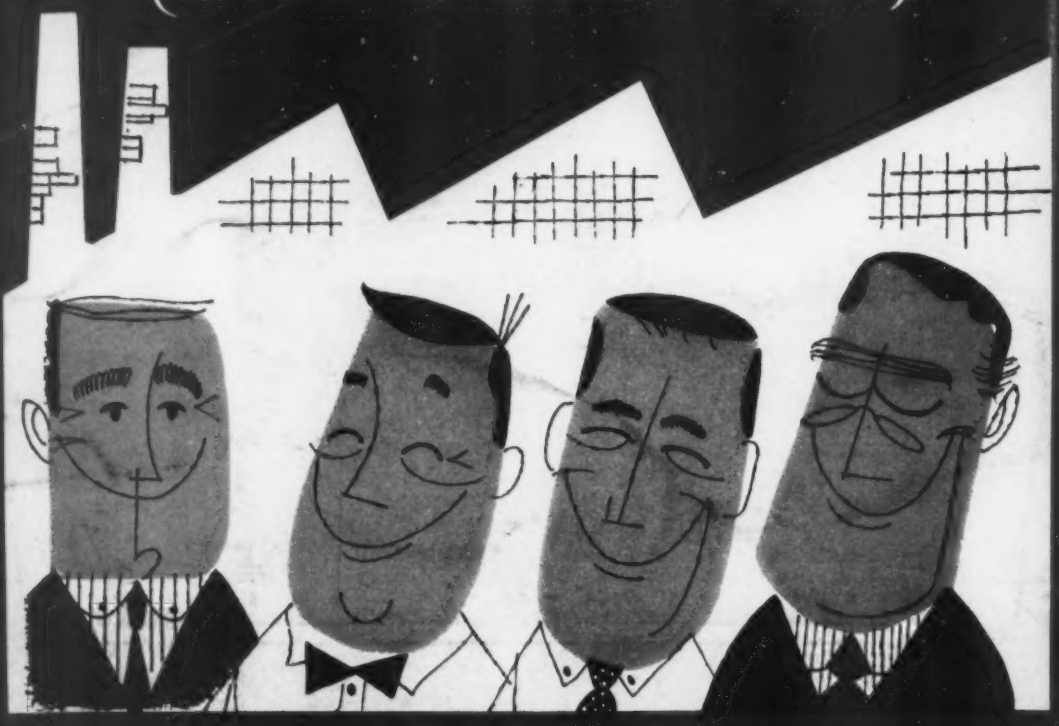
(a MELOSTRENGTH® Resin)



gives everybody something to smile about

Ask people around a mill that produces top-quality wet-strength grades. PAREZ RESIN 607 makes everybody happy.

Production Superintendent: "I'm keen to get the job out fast with no headaches. PAREZ 607 gives the highest wet strength possible in the widest variety of pulps. On top of this, I have fewer foam and pitch problems, less wet press sticking and improved fiber and filler retention."

Purchasing Agent: "Frankly, I'm a bug on over-all costs. PAREZ 607 is packed dry in bags, so it means lower shipping costs, easier handling, less storage space—and it keeps, too, with a shelf life of years instead of months. We don't have to use alum or catalysts to 'set' it in the pulp, and it makes our wax and rosin size go further."

Sales Manager: "This paper moves fast in our markets—after all, it's a MELOSTRENGTH® Paper, promoted by Cyanamid's National MELOSTRENGTH Program. I don't have to worry about delays in delivery, either, because we get wet strength right at the reel. My customers stay happy, too, because PAREZ 607 gives us consistent results."

President: "All these things, of course, add up to profit—which is really what keeps us all smiling."

(Your Cyanamid Representative: "We're always happy to help you in any way to use PAREZ 607 to your profit. Just give us a call.")

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